Guidelines for Using FAA-iCMM â v2.0 and ISO 9001:2000 in Process Improvement

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1. Introduction

These guidelines were developed to explain the relationship between FAA-iCMM v2.0 (iCMM) and ISO 9001:2000 (ISO 9001). They can be used by any organization that is interested in process improvement and wishes to understand how iCMM and ISO 9001 can help. They address how the iCMM can be used to meet each requirement identified in ISO 9001, and how meeting ISO 9001 requirements can support improving process capability as described in the iCMM.

1.1 Background: ISO 9001:2000 as part of iCMM v2.0

ISO 9001:2000 is one of the 10 sources used for the development of iCMM v2.0. The resulting iCMM product integrates the practices and principles of all the sources. Thus, in many cases, the iCMM is more comprehensive than any particular source (such as ISO 9001), because it includes practices of all the sources. In many cases, the sources were mutually supportive of the same idea (although it may have been expressed using different words). When a particular source was identified as being too prescriptive in selected areas, the prescriptive information was typically provided as informative material in the iCMM. In general, ISO 9001 is narrowly focused on developing a Quality Management System while iCMM addresses a much broader scope.

All organizations using the iCMM as process improvement guidance should interpret the model in the context of their specific business objectives. If pursuing ISO 9001 certification is a business objective, the iCMM practices should be implemented with that in mind. Similarly, if an ISO 9001 certified organization has an objective to pursue iCMM-based process improvement, ISO 9001 requirements should be implemented accordingly. *This document provides guidance regarding how these things might be done.*

1.2 Intended Audience

Users of this document should be the technical people concerned with assuring process improvement implementation is compliant with both iCMM and ISO 9001.

Organizations using this document are expected to be in one of the following categories:

- Already using ISO 9001, but also interested in iCMM
- Already using iCMM, but also interested in ISO 9001
- Starting out and interested in pursuing both iCMM and ISO 9001 concurrently

The guidelines explain what each audience needs to do to be compliant with:

- iCMM if already using ISO 9001
- ISO 9001 if already using iCMM
- Both iCMM and ISO 9001, concurrently, if just starting

1.3 Assumptions

Readers are expected to be familiar with both iCMM v2.0 and ISO 9001. This document does not provide full information on either of these approaches, but provides guidance on how they relate and can be used together. It attempts to provide enough concise guidance for the reader to be able to pursue lower level details efficiently, yet not replicate all the information that is in the individual documents. The interested reader can find details of ISO 9001 requirements and iCMM practices in the respective full documents.

1.4 Structure of this Document

This document is organized as follows:

1. Introduction
2. General Considerations
3. iCMM Practices that Support ISO 9001 Requirements
4. ISO 9001 Requirements that Support iCMM practices
5. References and Further Information
6. Acknowledgements

Table 1: Mapping ISO 9001:2000 to FAA-iCMM v2.0
Table 2: Mapping FAA-iCMM v2.0 to ISO 9001:2000
Table 3: FAA-iCMM v2.0 Generic Practices

2. General Considerations

2.1 The Most Frequently Asked Questions

The iCMM and ISO 9001 are closely aligned and mutually supportive in many areas. Achieving improvements using one or the other greatly supports accomplishments in both. People frequently ask "If I am ISO 9001 certified, where am I in relation to the iCMM?" or "If I am at maturity level x in relation to the iCMM, where am I in relation to ISO 9001 certification?" Whereas there are no simple answers to these questions, there are some statements that can be made.

An organization that has achieved iCMM capability level 2 across the iCMM process areas and has implemented practices according to these guidelines is highly likely to achieve ISO registration. Further, since continuous improvement is required in ISO 9001, GP 3.3 Improve Processes should also be in place. Note however that not all iCMM practices are needed for compliance with ISO 9001. For example only one practice of PA 04 Alternatives Analysis, and one practice of PA 23 Innovation are needed for ISO 9001 compliance, and only a few practices of PA 03 Design, PA 07 Integration, PA 12 Supplier Agreement Management, PA 14 Integrated Teaming, and PA 20 Process Definition. Also, not all the iCMM level 2 generic practices need to be in place on these 7 PAs, or on any of the remaining 16 PAs of the iCMM, so capability level 2 is actually beyond what is required by ISO 9001. Table 2 indicates which iCMM practices need to be in place, with corresponding ISO requirements, and those practices with no corresponding ISO 9001 requirement do not need to be implemented for ISO registration. Generic practices that need to be in place to meet ISO 9001 requirements are indicated in Table 1.

Achieving ISO 9001 certification will result in partial coverage of most iCMM process areas, if requirements are met according to these guidelines. However, additional practices may also be required for selected process areas, and additional generic practices would be required in order to achieve capability level 2. Table 1 indicates which iCMM practices are at least partially addressed by each ISO 9001 requirement. Table 3 identifies the iCMM generic practices that need to be in place for iCMM capability level achievements.

2.2 Using and Interpreting the Mapping Tables

The mapping tables attached to this document indicate which iCMM practices address ISO 9001 requirements. As iCMM practices were developed, ISO 9001 content contributed significantly to this development and the tables provide traceability back to this source. However, it may be possible to implement an iCMM practice and still not meet its corresponding ISO 9001 requirement. This is because the iCMM does not indicate how a practice must be implemented, or what the output of a practice must be called, or who in particular must perform a practice. Whereas there is informative material in the iCMM to guide implementation, specific implementation methods to meet ISO 9001 requirements (or requirements of any of the other source documents)

are not specifically called out in the iCMM. Since ISO 9001 sometimes requires that a practice be performed in a particular way, or by a particular person, or result in a particular output, it is very important for iCMM users to address these particular cases if they are interested in ISO 9000 certification. Similarly, an organization that is implementing ISO 9001 would not necessarily be addressing all iCMM requirements. The mapping tables indicate which additional practices, beyond ISO 9001 requirements, would need to be implemented for iCMM achievements.

The purpose of this document is to provide these mapping tables and elaborate upon them in order to address the above points.

2.3 Using Table 1: Mapping ISO 9001:2000 to FAA-iCMM v2.0 Practices

Table 1 answers the question: what iCMM practices should be in place to satisfy ISO 9001 requirements? It is organized by ISO 9001 sub-clause. Section 3 of this document basically walks through Table 1, section by section, pointing out, if needed, any particular way the corresponding iCMM practices need to be implemented to address ISO 9001 requirements.

Table 1 and Section 3 are oriented towards users who are already using iCMM and are additionally interested in ISO 9000 compliance, or towards users concurrently addressing iCMM process improvement and ISO 9000 compliance. The iCMM practices identified, if implemented according to these guidelines, should result in ISO 9000 compliance.

2.4 Using Table 2: Mapping FAA-iCMM v2.0 Practices to ISO 9001:2000

Table 2 looks at the information the other way. It is organized by iCMM process area, and it shows what requirements in ISO 9001 relate to base practices in the iCMM, or what parts of the iCMM are at least partially addressed when the aligned ISO 9001 requirement is met. It also points out iCMM practices that have no counterpart in ISO 9001, and thus an ISO 9001 user also interested in iCMM achievement, would need to implement those additional practices.

Table 2 and Section 4 would be useful to ISO 9001 users who are also interested in iCMM achievements. They indicate how ISO 9001 requirements, if already met, might contribute to iCMM practice implementation. However, just as is the case above, ISO 9001 compliance alone is not likely to satisfy iCMM practices, and where additional guidance is needed, that is pointed out in the text in Section 4. Table 3 supplements this information by listing, for ease of reference, the iCMM generic practices that need to be in place for iCMM capability level achievements.

2.5 General Comparison of Selected Features of ISO 9001 and iCMM

The table below compares selected general topics of ISO 9001:2000 and iCMM v2.0

General Topic	ISO 9001: 2000	iCMM v2.0
Records	ISO 9001 requires specific "records" to be retained as part of the quality management system. These specific instances are pointed out in the guidelines and include records in the following areas: • Management review (5.6.1) • Competence, awareness and training (6.2.2) • Planning of product realization (7.1) • Review of requirements related to the product (7.2.2) • Design and development inputs (7.3.2) • Design and development review (7.3.4) • Design and development verification (7.3.5) • Design and development validation (7.3.6) • Control of design and development changes (7.3.7) • Purchasing process (7.4.1) • Validation of processes for production and service provision (7.5.2) • Identification and traceability (7.5.3) • Customer property (7.5.4) • Control of monitoring and measuring devices (7.6) • Internal audit (8.2.2) • Monitoring and measurement of product (8.2.4) • Control of nonconforming product (8.3) • Corrective action (8.5.2) • Preventive action (8.5.3)	iCMM identifies some cases where results of implementation of practices are expected to be recorded. Examples include: • Statement of Need (PA 01) • Requirements (PA 02) • Evaluation results (PA 08) • Project Plans (PA 11) • Supplier Agreements (PA 12) • Quality Assurance and Management Results (PA 15) • Configuration Status (PA 16) • Measurement data and results (PA 18) • Standard processes (PA 21) • Training records (PA 22) However, the iCMM indicates that items to be placed under configuration management or information management are selected and identified by the implementing organization according to business needs. Each iCMM practice however identifies "typical work products" that might result from implementing that practice. It is expected that some artifact be produced indicating that a practice has been implemented in iCMM.
Control of Records	ISO 9001 is very specific regarding control of records. Any document identified as a "record" (see above) must remain legible, readily identifiable and retrievable. Further, there must be a documented procedure (see below) defining the controls needed for identification, storage, protection, retrieval, retention time and disposition of items designated as records.	iCMM identifies practices that must be in place for controlling designated work products or information items. However, the specific items are determined by the implementing organization. The practices of the iCMM that need to be in place via a documented procedure to meet this ISO 9001 requirement are identified in the discussion of 4.2.4 "Control of Records", page 9.

General Topic	ISO 9001: 2000	iCMM v2.0
Documented Procedure	ISO 9001 defines a "documented procedure" to mean the procedure is established and documented, implemented, and maintained. Documented procedures are required in 6 specific instances that are pointed out in the guidelines and relate to the following areas: • Control of documents (4.2.3) • Control of records (4.2.4) • Internal audit (8.2.2) • Control of nonconforming product (8.3) • Corrective action (8.5.2) • Preventive action (8.5.3)	iCMM expects at capability level 2 that the process for performing all practices be documented (GP 2.2). That process description may include procedures. When a "documented procedure" is mentioned as an ISO 9001 requirement, the following practices of the iCMM should be in place to accommodate the ISO 9001 definition of "documented procedure": GP 2.2 Document the Process (to assure the procedure is established and documented); GP 2.8 Consistently Use and Manage the Process (to assure the procedure is implemented); BP 16.02 Identify and Baseline Configuration Items and Interim Work Products (to assure the procedure is maintained and up to date).
Roles and responsibilities	ISO 9000 sometime requires that responsibility be assigned to a specific person or group, for example a "management representative" in (5.5.2).	iCMM indicates that responsibilities be assigned for all processes performed, via generic practice GP 2.5, but it does not prescribe a particular title.
Generic Practices	There are no "generic practices" in ISO 9001. However there are requirements in various sub-clauses that call for implementing many of the same concepts that are embodied in the iCMM generic practices.	The generic practices in the iCMM help an organization develop the infrastructure for establishing, maintaining, and continuously improving any processes, including those required in ISO 9001. Many of the ISO 9001 requirements are met by the application of iCMM generic practices to processes that are part of a quality management system, and to the quality management system itself. For example, PA 15 Quality Assurance and Management (QAM) is one of 23 process areas in the iCMM, and the QAM process is performed, managed, standardized, and continuously improved by applying the iCMM generic practices to it. iCMM generic practices require that: an organizational policy be established; processes be planned, documented, and coordinated; adequate resources be allocated; practitioners have knowledge and skills; process compliance and product conformance with requirements be objectively assessed; measurement, review, corrective action, standardization, and continuous improvement of process performance.
Certification	For ISO 9000 certification, requirements of the standard must be met. If requirements are not implemented in a quality management system, the organization may identify exclusions for approval by the ISO 9000 registrar.	There is no "certification" with the iCMM, and the model is intended for selective use based on business objectives. Appraisals can indicate achievement of capability levels in areas selected, or achievement of maturity levels.

3. iCMM Practices that Support ISO 9001 Requirements

This section is organized by the clause numbering in ISO 9001, and explains what iCMM practices need to be in place to meet each ISO 9001 requirement.

4. Quality Management System

Clause 4 of ISO 9001 describes requirements for a quality management system. The requirements are described in 2 sub-clauses: 4.1 General Requirements, and 4.2 Documentation Requirements.

4.1 Quality Management System – General Requirements

The general requirements set forth in ISO 9001 (4.1) call for an organization to establish, document, implement and maintain a quality management system, and continually improve its effectiveness. In the iCMM, these general requirements are addressed most specifically in practice BP 15.01. The documented quality management system, identified as a typical work product of this practice, is required when seeking ISO 9001 compliance. Additional practices in the iCMM address creating the quality management system as an organizational standard process (BP 20.01) and continually improving that process (BP 21.05, BP 21.06, and BP 21.08).

ISO 9001 states that the processes in the quality management system shall be managed by the organization in accordance with ISO 9001 requirements. These guidelines identify interpretations of iCMM practices that intend to meet this requirement.

ISO 9001 general requirements also state that an organization may choose to outsource any process, and if so, the organization must ensure control over such processes. These requirements are addressed in the iCMM via BP 05.01 and BP 12.04.

Other general requirements in ISO 9001 (4.1) are addressed by the generic practices of the iCMM as indicated in the table below in particular when applied to PA 15.

4.1 General requirements	BP 05.01 Identify Needed Products or Services BP 12.04 Monitor Supplier's Plans, Processes, Activities and Products BP 15.01 Establish a Quality Management System BP 20.01 Establish Standard Processes BP 21.05 Implement Improvements BP 21.06 Confirm Improvements BP 21.08 Monitor Performance GP 2.2 Document the Process GP 2.3 Plan the Process GP 2.4 Provide Adequate Resources GP 2.10 Objectively Assess Process Compliance GP 2.12 Measure Performance GP 2.13 Review Performance with Higher-level Management GP 2.14 Take Corrective Actions GP 3.1 Standardize the Process GP 3.3 Improve Processes

4.2 Quality Management System – Documentation Requirements

4.2.1 General and 4.2.2 Quality Manual

The General (4.2.1) and Quality manual (4.2.2) documentation requirements of ISO 9001 are addressed by BP 15.01. In addition, BP 00.01 supports the ISO 9001 general requirement to document strategic statements pertaining to values and expectations. GP 3.1 and supporting practice BP 20.01 assure the description of process interactions. ISO 9001 (4.2.1) requires documents to ensure "planning, operation, and control of its processes" and these requirements are met when applying GP 2.3, GP 2.10, GP2.12, GP 2.13, and GP 2.14.

GP 2.1, when applied to PA 15 Quality Assurance and Management, assures that quality policy is in place, and GP 2.3 assures that objectives for quality assurance and management are identified. GP 2.2 assures that processes performed are documented, including procedures when required. The iCMM does not require that this process be called a Quality Manual or a Quality Management System. Those seeking ISO 9001 certification however may need to use very specific names for the processes they follow. BP 17.01 should be implemented to list and include the records that are required for ISO 9001 compliance. (See Section 2.5)

When implementing BP 15.01, ISO 9001 users need to assure that the quality manual identifies the scope of the quality management system, including any exclusions (4.2.2). Documented procedures (see Section 2.5) may be in, or referenced in, the quality manual.

4.2.1 General	BP 00.01Establish and Maintain Strategic Vision BP 15.01 Establish a Quality Management System BP 20.01 Establish Standard Processes GP 2.1 Establish Organizational Policy GP 2.2 Document the Process GP 2.3 Plan the Process GP 2.10 Objectively Assess Process Compliance GP 2.12 Measure Process Performance GP 2.13 Review Performance with Higher-level Management GP 2.14 Take Corrective Action GP 3.1 Standardize the Process
4.2.2 Quality manual	BP 15.01 Establish a Quality Management System BP 17.01 Establish Information Management Strategy BP 20.01 Establish Standard Processes GP 2.2 Document the Process GP 3.1 Standardize the Process

4.2.3 Control of Documents and 4.2.4 Control of Records

ISO 9001 requirements for Control of documents (4.2.3) and Control of records (4.2.4) are mainly addressed by several practices in PA 16 Configuration Management and PA 17 Information Management, as shown below. Note that these practices pertain to documents of external as well as internal origin, and to the management of obsolete documents if they are to be retained for any purpose. "Legibility" of records is addressed in BP 17.05, and "identification" of records is addressed in BP 17.01. Application of GP 2.2 and GP 2.8 address the requirement for a documented procedure and they should be applied to both PA 16 and PA 17 with respect to both control of documents and control of records. The procedures should be maintained, by identifying them as configuration items when performing BP 16.02. In addition, iCMM practice BP 08.07 addresses ISO 9001 (4.2.4) requirements to provide evidence of conformity to requirements and BP 15.04 addresses records pertaining to effective operation of the quality management system.

4.2.3 Control of documents	BP 16.01 Establish a Configuration Management Strategy BP 16.02 Identify and Baseline Configuration Items and Interim Work Products BP 16.03 Establish and Maintain a Repository for Work Product Baselines BP 16.04 Control Changes BP 16.05 Record and Report Configuration Status BP 17.04 Share Information BP 17.05 Protect Information GP 2.2 Document the Process GP 2.8 Consistently Use and Manage the Process GP 2.9 Manage Work Products
4.2.4 Control of records	BP 08.07 Analyze Evaluation Results BP 15.04 Record and Report Results BP 16.02 Identify and Baseline Configuration Items and Interim Work Products BP 16.03 Establish and Maintain a Repository for Work Product Baselines BP 16.04 Control Changes BP 17.01 Establish Information Management Strategy BP 17.03 Store Information BP 17.04 Share Information BP 17.05 Protect Information GP 2.2 Document the Process GP 2.8 Consistently Use and Manage the Process GP 2.9 Manage Work Products

5. Management Responsibility

There are 4 PAs in the iCMM that most directly support ISO 9001 Management responsibility clause: PA 00 Integrated Enterprise Management; PA 01 Needs; PA 15 Quality Assurance and Management; and PA 11 Project Management. (PA 21 Process Improvement also plays a part to ensure continual improvement, but this is more directly addressed in sub-clause 8.5, below.) Then several generic practices are required to be applied to these PAs, as indicated in the table below. Of particular note, GP 2.5 must assign "top management" responsibility to these activities, where for ISO 9001 considerations "top management" needs to be the manager at the highest level within the scope of an ISO 9001 audit. This definition also needs to be used when implementing GP 2.13, and in practices that refer to "higher-level management" or "senior management" in the iCMM.

5.1 Management Commitment

Management commitment (5.1) in ISO 9001 requires evidence that top management is communicating the importance of meeting requirements, establishing quality policy, ensuring quality objectives are established, conducting reviews, and ensuring the availability of resources.

The iCMM addresses this requirement in 2 ways. One way is by applying the Generic Practices to PA 15 Quality Assurance and Management. This requires organizational quality policy, quality objectives, management review, and adequate resources for performing quality assurance and management. As noted above, GP 2.5 needs to be implemented to assure "top management" responsibility for PA 15.

Another way that the iCMM can help in meeting ISO 9001 requirements here is through the practices in PA 00. In the iCMM, best practices for top management leadership, management, and direction are provided in PA 00 Integrated Enterprise Management. The iCMM does not prescribe what the corporate vision, values, goals and objectives should be since this is the prerogative of the enterprise. It recommends, however, that the needs of key stakeholders be accounted for and suggests typical organizational values and expectations, such as "strong customer focus", "enhancing customer value", "customer satisfaction", "product and service performance" and others. The practices of PA 00 require communicating, allocating resources, ensuring objectives are met, and management review at the strategic level.

Organizations using the enterprise-level iCMM guidance to pursue ISO 9001 certification would need to assure that PA 00 practices are implemented as prescribed by ISO 9001 (e.g., with a specific focus on quality policy and objectives)

5.1 Management commitment	BP 00.01 Establish and maintain strategic vision. BP 00.02 Align to achieve the vision BP 00.03 Establish and maintain strategy BP 00.04 Develop and deploy action plans BP 00.05 Review performance BP 00.06 Act on results of review

	GP 2.1 Establish Organizational Policy GP 2.4 Provide Adequate Resources GP 2.5 Assign Responsibility GP 2.13 Review Performance with Higher-level Management GP 2.14 Take Corrective Action GP 3.3 Improve Processes

5.2 Customer Focus

Customer focus (5.2) in ISO 9001 indicates that customer requirements must be determined and met with the aim of enhancing customer satisfaction. In the iCMM, the Needs process area (PA 01) focuses on the customer. It requires that customers be identified, their needs elicited, and their satisfaction determined. Practice BP 02.07 requires customer agreement and approval that their needs and expectations are captured in documented requirements that also conform to agreed quality criteria.

5.2 Customer focus	BP 01.01 Identify Customers and Stakeholders BP 01.02 Elicit Needs BP 01.06 Determine Customer Satisfaction BP 02.07 Record and Baseline Requirements

5.3 Quality Policy and 5.4 Planning

Quality Policy (5.3) in ISO 9001 is addressed by the iCMM practices indicated in the following table, and as discussed above under Management Commitment (5.1). BP 00.02 includes establishing the infrastructure and leadership system for decision-making and reinforcement (analogous to ISO 9001 requirement for a "framework" for establishing and reviewing quality objectives). Communication is required in BP 00.01; review is required in BP 00.05.

Planning (5.4) in ISO 9001 is addressed through applying generic practice GP 2.3 to Quality Assurance and Management (PA 15), which includes delineating measurable quality objectives. BP 15.01 requires that the quality management system be maintained, and GP 2.14 applied to PA 15 assures corrective action is taken when necessary. Planning at the strategic level is addressed in BP 00.03 and BP 00.04. Quality objectives are included in a statement of need (BP 01.04).

5.3 Quality policy	BP 00.01 Establish and Maintain Strategic Vision. BP 00.02 Align to Achieve the Vision BP 00.05 Review performance GP 2.1 Establish Organizational Policy
5.4 Planning (title only)	
5.4.1 Quality objectives	BP 00.02 Align to Achieve the Vision BP 00.03 Establish and Maintain Strategy BP 00.04 Develop and deploy action plans BP 01.04 Establish and Maintain a Statement of Need BP 15.01 Establish a Quality Management System

	GP 2.3 Plan the Process
5.4.2 Quality management system planning	BP 15.01 Establish a Quality Management System GP 2.3 Plan the Process GP 2.14 Take Corrective Action

5.5 Responsibility, authority and communication

Responsibility, authority and communication (5.5) in ISO 9001 is addressed by iCMM generic practices as applied to specific process areas. GP 2.5 requires establishing responsibility, authority, commitment and accountability; GP 2.15 requires coordination and communication. These generic practices address sub-clause 5.5 when applied to the appropriate processes (e.g. PA 15 Quality Assurance and Management for quality management system responsibilities; PA 01 Needs for customer communication responsibilities; PA 00 Integrated Enterprise Management for responsibility to communicate expectations pertaining to the customer and product and service performance.) Note however, that the iCMM does not prescribe that the responsible person(s) be called "management representative". If such a specific designation be required for ISO 9001 certification, then the organization can designate accordingly.

Again, PA 00 Integrated Enterprise Management provides guidance for assuring communication regarding strategic direction, objectives, and actions being undertaken to accomplish them. Communications regarding the effectiveness of the quality management system can also be addressed by the application of GP 2.12, GP2.13, and GP 2.15 to PA 15. These processes would be established by the application of GP 2.2.

5.5 Responsibility, authority, communication (title only)	
5.5.1 Responsibility and authority	GP 2.5 Assign Responsibility GP 2.15 Coordinate with Stakeholders
5.5.2 Management representative	GP 2.5 Assign Responsibility GP 2.15 Coordinate with Stakeholders
5.5.3 Internal Communication	BP 00.02 Align to achieve the vision BP 00.03 Establish and maintain strategy BP 00.04 Develop and deploy action plans GP 2.2 Document the Process GP 2.5 Assign Responsibility GP 2.12 Measure Process Performance GP 2.13 Review Performance with Higher-level Management GP 2.15 Coordinate with Stakeholders

5.6 Management Review

The iCMM requires management review at several levels: for each process that an organization performs via GP 2.13; for each project that an organization undertakes via BP 11.11; for each strategic action deployed across an enterprise via BP 00.05. Similarly, the iCMM requires corrective action be taken as a result of review at the process level (GP 2.14), at the project level (BP 11.12), and at the enterprise level (BP 00.06). Note that records from management reviews must be retained in records as described in section 2.5.

There are specific requirements regarding review input (5.6.2). The iCMM is more comprehensive in its review requirements, and requires for each process (GP 2.13), review of "activities, status, and results". When applied to PA 15, this covers ISO input requirements a) c) d) f) and g). When applied to PA 01 Needs, this address ISO input requirement b). ISO 9001 input requirement e) is part of general tracking of action items (covered under outputs below). For a project, iCMM requires review of performance measurement data (this is also required to be reviewed with customers). For the enterprise, iCMM requires review of performance relative to goals and changing needs across the enterprise (this includes identifying specific reporting requirements, and including employee feedback). Those seeking to meet ISO 9001 requirements should assure that the specific reporting requirements set at the enterprise level address ISO 9001 requirements.

ISO 9001 review output (5.6.3) requirements include any decisions and actions related to process improvement, product improvement, and resource needs. The iCMM is more comprehensive and requires that corrective action for any process address "problems" including "requirements and objectives not being satisfied, noncompliance or other issues are identified, or when progress differs significantly from plan" (GP 2.14). BP 11.12 similarly requires corrective action to address any problems, including reallocation of resources if required, and corrective actions are required to be tracked to closure. BP 00.06 requires that actions be taken to deploy improvements (including improvement of leadership and management effectiveness).

5.6 Management review	
5.6.1 General	BP 00.05 Review performance GP 2.13 Review Performance with Higher-level Management
5.6.2 Review input	BP 00.05 Review performance BP 11.11 Review and Analyze Project Performance GP 2.13 Review Performance with Higher-level Management
5.6.3 Review output	BP 00.05 Review performance BP 00.06 Act on Results of Review BP 11.11 Review and Analyze Project Performance BP 11.12 Take Corrective Action GP 2.13 Review Performance with Higher-level Management GP 2.14 Take Corrective Actions GP 3.3 Improve Processes

6. Resource Management

ISO 9001 requirements for Resource Management (clause 6) are addressed by practices in several iCMM process areas: PA 00 Integrated Enterprise Management, PA 08 Evaluation, PA 09 Deployment, Transition, and Disposal, PA 22 Training, and PA 23 Innovation and by means of generic practices.

6.1 Provision of Resources and 6.2 Human Resources

Provision of resources (6.1) in ISO 9001 is included in the iCMM for any activities that the enterprise decides to pursue in BP 00.04. Additionally, BP 11.07 obtains resources for any planned project activities. GP 2.4 assures that processes performed are adequately resourced, including those used to implement, maintain, and improve a quality management system.

Human resource requirements in ISO 9001 (6.2.1 and 6.2.2) are met when an organization performs iCMM practice GP 2.6 in relation to the work it performs. Several practices in PA 22 Training (as identified below) directly address ISO 9001 sub-clause 6.2.2 requirements, and BP 00.02 assures that personnel are aware of the alignment, relevance, importance, and contribution of their activities to enterprise-established direction. Note that records of education, training, skills and experience must be retained in records as described in section 2.5.

6.1 Provision of resources	BP 00.04 Develop and deploy action plans BP 11.07 Establish Commitment GP 2.4 Provide Adequate Resources (applied to PAs 00, 01, 08, 15, 20, and 21)
6.2 Human resources (title only)	
6.2.1 General	GP 2.6 Ensure Skill and Knowledge
6.2.2 Competence, awareness and training	BP 00.02 Align to achieve the vision. BP 22.01 Identify Training Needs BP 22.04 Train Individuals BP 22.05 Establish and Maintain Records BP 22.06 Assess Training Effectiveness BP 22.07 Establish Learning Environment GP 2.6 Ensure Skill and Knowledge

6.3 Infrastructure and 6.4 Work Environment

Infrastructure and work environment requirements in ISO 9001 (6.3) and (6.4) are addressed in the iCMM generic practices GP 2.3 and GP 2.4. These practices require determining and providing resources adequate to perform the work (any work), and resources include physical facilities and work environment, tools, workspace, and appropriate skill mix.

The iCMM also emphasizes infrastructure requirements in some very specific areas: BP 06.01 includes methods, standards, and tools for implementation; BP 08.03

requires that tools, facilities, personnel, documentation, and needed environment (such as laboratories, test equipment, simulators) be established and maintained to support planned evaluations; BP 09.02 requires facilities and infrastructure be established for operating any product or service; BP 16.03 and BP 17.02 focus on infrastructure requirements for Configuration Management and Information Management. Lastly, BP 23.05 more generically includes managing innovation of the work environment to support individual projects and improve business results. Work environment maintenance is also included.

Note that there are several practices in the iCMM that require an appropriate "environment" for carrying out the work. For example, a cooperative/ collaborative/ communications environment with suppliers is described in PA 05 Outsourcing and PA 12 Supplier Agreement Management; a collaborative teaming environment is described in PA 14 Integrated Teaming; a learning environment is described in PA 22 Training; a quality environment is mentioned in PA 15 Quality Assurance and Management. Lastly, PA 01 Needs requires understanding the environment in which products or services will be provided, and PA 11 Project Management plans would typically include plans for meeting infrastructure and work environment requirements. These practices provide further elaboration to GP 2.3 and GP 2.4 when applied to these PAs.

6.3 Infrastructure	BP 06.01 Establish the Implementation Environment BP 08.03 Establish and maintain evaluation environment BP 09.02 Prepare Facility and Infrastructure Environment BP 16.03 Establish and Maintain a Repository for Work Product Baselines BP 17.02 Establish Information Management Capability BP 23.05 Manage Innovation GP 2.3 Plan the Process GP 2.4 Provide Adequate Resources
6.4 Work environment	BP 01.03 Analyze Needs BP 05.05 Communicate with Suppliers BP 06.01 Establish the Implementation Environment BP 08.03 Establish and maintain evaluation environment BP 09.02 Prepare Facility and Infrastructure Environment BP 11.06 Establish and Maintain Plans BP 12.05 Foster Cooperative and Collaborative Environment. BP 14.03 Establish and Maintain a Collaborative Workplace BP 22.07 Establish Learning Environment BP 23.05 Manage Innovation GP 2.3 Plan the Process GP 2.4 Provide Adequate Resources

7. Product Realization

The ISO 9001 Product Realization Clause (7) covers a lot of territory including Planning, Customer-related processes (requirements and customer communications), Design and Development, Production and service provision, Purchasing, and Control and Monitoring of measuring devices. Key iCMM PAs that address the above, in the same order, are Project Management, the life cycle PAs, Outsourcing and Supplier Agreement Management, Design Implementation (implementation environment), and Evaluation (evaluation environment). The essential base and generic practices, for correlation with ISO 9001, are discussed below for each sub-clause and summarized in the tables.

7.1 Planning of Product Realization

The Project Management Process Area (PA 11) provides the core practices for planning product realization. Key practices from PA02 Requirements, PA 08 Evaluation, PA 15 Quality Assurance and Management, along with selected Generic Practices support product realization planning. BP 11.06 and GP 2.3 provide for the overall planning and process development, while GP 2.15 ensures consistency between product realization and quality management system processes. The establishment of product requirements is addressed by PA 02 Requirements and summarized by BP 02.07. Product quality objectives are addressed by BP 11.01 and BP 15.01. GP 2.7 covers both deliverable and non-deliverable work products and should be interpreted to include all requirements, including those relating to quality. Determination of needed processes and documents is addressed by GP 2.2 and BP 11.01, while determination of needed resources is addressed by BP 11.04. Determination of the required product verification, validation and test activities is covered by PA 11. BP 11.01 and BP 11.06 cover planning of all the activities required to produce a product as listed in ISO clause 7.1 c). GP 2.3 when applied to PA 15 Quality Assurance and Management should be interpreted to address determination of product quality monitoring needs. ISO 9001 requires determination of product acceptance criteria, as appropriate (by working with the acquirer). ISO 9001 requires a determination of the need for records, in accordance with 4.2.4 (see section 2.5), to provide evidence that processes and products meet requirements; this is accomplished in iCMM through the activities of BP 11.01.

7.1 Planning of product realization	BP 02.07 Record and Baseline Requirements BP 11.01 Define Project Objectives, Scope, and Outputs BP 11.04 Estimate Project Resource Requirements BP 11.06 Establish and Maintain Plans BP 15.01 Establish a Quality Management System GP 2.2 Document the Process GP 2.3 Plan the Process GP 2.7 Establish Work Product Requirements GP 2.15 Coordinate with Participants and Stakeholders

7.2 Customer-related processes

The ISO 9001 section on Customer-related processes covers product requirements, requirements review, and customer communication. The iCMM addresses these topics primarily with PA 01 Needs and PA 02 Requirements, augmented with selected GPs, as indicated below.

7.2.1 Determination of requirements related to the product

The iCMM process areas PA 01 Needs and PA 02 Requirements fully addresses the ISO 9001 Determination of requirements related to the product (7.2.1). Base and generic practices that specifically correspond to the ISO 9001 sub-clauses are shown in the table below. BP 01.02 and BP 01.03 address obtaining and analyzing customer needs for determination of requirements. BP 02.01, BP 02.02, BP 02.04, and BP 02.05 address all stated and derived requirements for products and services. Any additional requirements (e.g., as determined by the organization) are handled by GP 2.7. The practices of PA 02 cover the determination of all requirements, whether stated by the customer or not, and being all-inclusive would include any requirements relating to delivery and post-delivery activities, as specifically required by ISO 9001.

7.2.1 Determination of requirements related to the product	BP 01.02 Elicit Needs BP 01.03 Analyze Needs BP 02.01 Identify Functional and Performance Requirements BP 02.02 Identify Nonfunctional Requirements and Constraints BP 02.04 Derive Requirements BP 02.05 Identify External Interface Requirements GP 2.7 Establish Work Product Requirements

7.2.2 Review of Requirements related to the product

Review of requirements as described in ISO 9001 sub-clause 7.2.2 is addressed by iCMM PA 02 Requirements, PA 08 Evaluation, and GP 2.11 (applied to PA 02). ISO 9001 requires requirement reviews prior to commitment to supply a product. Organizational commitment to requirements is addressed by iCMM BP 11.01 and BP11.07.

Reviews to assure that products are defined are addressed in the iCMM through the application of BP 02.06, BP 01.03, BP 00.04, and by GP 2.11 to PA 02 Requirements. Requirement changes (sub-clause 7.2.2b), including review, coordination and documentation, are addressed primarily by BP 16.04 and supported by BP 01.05, BP 02.07, and BP 02.08. The ability to meet defined requirements (sub-clause 7.2.2c) is addressed by BP 00.04, through prioritization and alignment of action plans with business objectives. BP 08.04 applied to the work products of PA 02 Requirements addresses all of ISO 9001 sub-clause 7.2.2, including documentation of review results (e.g., Typical Work Products - system requirement review minutes). ISO 9001 requires that records of the results of reviews and actions be maintained, according to clause 4.2.4 – control of records (as described in Section 2.5).

The case identified by ISO 9001 where the customer provides no documented requirements is fully addressed by application of certain practices of iCMM PAs 01 Needs and 02 Requirements and the use of GP 2.11 for their review. Requirement changes and review thereof is provided for by iCMM BP 16.04 (to the Requirements work products).

7.2.2 Review of requirements related to the product	BP 00.04 Develop and Deploy Action Plans BP 01.03 Analyze Needs BP 01.04 Establish and Maintain a Statement of Need BP 01.05 Communicate with Customers BP 02.06 Analyze Requirements BP 02.07 Record and Baseline Requirements BP 02.08 Analyze and Resolve Requirements Change Requests BP 08.04 Evaluate Incremental Work Products BP 11.01 Define Project Objectives, Scope, and Outputs BP 11.07 Establish Commitment BP 16.04 Control Changes GP 2.11 Objectively Verify Work Products

7.2.3 Customer communication

The iCMM addresses overall customer communication in BP 01.05; this practice includes achievement of a common understanding with customers and other stakeholders on their needs, expectations and measures of effectiveness. The practice specifically addresses communication on problems affecting products or service. Customer feedback, including measurements on complaint handling, is addressed in BP 01.06. Customer communication in specific areas is addressed in GP 2.15, BP 02.08 and BP 10.07.

7.2.3 Customer communication	BP 01.05 Communicate with Customers BP 01.06 Determine Customer Satisfaction BP 02.08 Analyze and Resolve Requirements Change Requests BP 10.07 Provide Customer Support GP 2.15 Coordinate with Stakeholders

7.3 Design and Development

ISO 9001 Design and Development (clause 7.3) covers the planning and control, the engineering lifecycle from requirements through verification and evaluation, and change control. The correspondence of these areas to the iCMM is straightforward via PA 11 Project Management, the iCMM lifecycle PAs (Needs, Requirements, Design, Integration, Design Implementation, Evaluation), and PA 16 Configuration Management. Other iCMM PAs provide support in specific areas, indicated in the sub-clause discussion and tables below.

7.3.1 Design and development planning

Design and development planning and control is addressed by PA 11 Project Management, GP 2.3, and selected planning practices of PA 07 Integration and PA 08 Evaluation.

Planning of design and development stages is addressed by iCMM BP 11.01 and BP 11.02. Determination of the review, verification and validation for each stage is addressed by BP 08.01, BP 08.02, and by the application of GP 2.3 to PA 11 (for planning reviews). Planning for integration is also addressed by BP 07.01. The ISO sub-clause on responsibility and authority is covered by iCMM BP 11.07 and GP 2.5. Management of group interfaces is addressed by iCMM BP 14.02, BP 14.04, BP 14.06, and GP 2.15 . The updating of plans, referred to at the end of ISO 9001 sub-clause 7.3.1, is addressed by BP 11.06.

7.3.1 Design and development planning	BP 07.01 Develop Integration strategy BP 08.01 Develop Evaluation Strategy BP 08.02 Develop Evaluation Procedures BP 11.01 Define Project Objectives, Scope, and Outputs BP 11.02 Define the Activities and Life Cycle Approach BP 11.06 Establish and Maintain Plans BP 11.07 Establish Commitment BP 14.02 Establish and Maintain Integrated teams BP 14.04 Establish Coordination and Communication Methods BP 14.06 Communicate Integrated Team Activity Results GP 2.3 Plan the Process GP 2.5 Assign Responsibility GP 2.15 Coordinate and Communicate with Stakeholders

7.3.2 Design and development inputs

The iCMM addresses Design and development inputs primarily through PA 02 Requirements. This PA addresses all aspects of inputs relating to requirements, including records via BP 02.07. ISO 9001 requires that records of all inputs to design and development relating to product requirements (e.g., requirements documents and any rationale, sources, traceability, review results, actions) be maintained and controlled, in accordance with clause 4.2.4 (see Section 2.5). BP 02.07 addresses configuration management and recording of requirements.

Functional and performance requirements are addressed by BP 02.01 and applicable statutory and regulatory requirements are addressed by BP 02.02 . The ISO sub-clause on previous similar designs is addressed by BP 03.02 Additional Practice Guidance: “Compare new designs with similar proven designs”. Other requirements (ISO 9001 sub-clause 7.3.2d) are addressed in the iCMM under BP 08.01, BP 02.04, and BP 02.02. Development of the evaluation strategy identifies the verification, validation and incremental work product review requirements, while the practice on deriving requirements covers the identification of any and all requirements that are necessary to

meet the stated requirements. The review of requirements for adequacy is handled by iCMM BP 02.06 and BP 08.04.

7.3.2 Design and development inputs	BP 02.01 Identify Functional and Performance Requirements BP 02.02 Identify Nonfunctional Requirements and Constraints BP 02.04 Derive Requirements BP 02.06 Analyze Requirements BP 02.07 Record and Baseline Requirements BP 03.02 Develop Design Structure BP 08.01 Develop Evaluation Strategy BP 08.04 Evaluate Incremental Work Products

7.3.3 Design and development outputs

ISO Design and development output clauses address the specifications for products and services and include meeting the input requirements, specific content and form, and control and approval. These areas are covered in a several places in iCMM, including PA03 Design, PA 06 Design Implementation, PA 16 Configuration Management, PA 05 Outsourcing and GPs on work product verification, work product management, and corrective action. Provision of outputs in a form enabling verification is addressed by GP 2.9. Approval of outputs is handled by BP 16.02 and 16.04. BP 08.04, BP 08.07 and BP 8.05 in combination with BP 11.12, would ensure that design and development input requirements are met. GP 2.11 and GP 2.14 – applied to PA03 Design and PA06 Design Implementation would also assure that requirements are met (The BPs provide more guidance). Information for purchasing, production, and service is addressed in iCMM by PA 05 Outsourcing (BP 05.01), PA03 Design (BP 03.06 and BP 03.08), and PA 06 Design Implementation respectively. ISO product acceptance criteria are covered under BP 05.03 via solicitation package requirements and evaluation criteria. Product characteristics are addressed in iCMM PA 03 Design (BP 03.06 and BP 03.08) and PA 06 Design Implementation (BP 06.03). For products that are not expected to go into production (ISO 7.5) BP 06.02 addresses building the product.

7.3.3 Design and development outputs	BP 03.06 Establish Component Specifications BP 03.08 Establish and Maintain Design Description BP 05.01 Identify Needed Products and Services BP 05.03 Prepare for Solicitation or Tasking BP 06.02 Formulate Product or Service Components BP 06.03 Develop Documentation BP 08.07 Analyze Evaluation Results BP 08.04 Evaluate Incremental Work Products BP 08.05 Verify end-Products BP 11.12 Take Corrective Action BP16.02 Identify and Baseline Configuration Items and Interim Work Products BP 16.04 Control Changes GP 2.9 Manage Work products GP 2.11 Objectively Verify Work Products GP 2.14 Take Corrective Action

7.3.4 Design and development reviews

Reviews of design and development results to meet requirements are primarily addressed in iCMM PA 11 Project Management and PA08 Evaluation. BP 08.04 and GP 2.11 address all stages of design and development review and are supported by GP 2.15, which ensures appropriate participation of groups and individuals. Problems, corrective actions, and maintenance of records of review results are addressed in iCMM BP 11.10 BP 11.11, BP 08.07 and in BP 11.12. ISO 9001 users should ensure that records of results of reviews and any necessary actions (e.g., informal and formal design review presentations, minutes, and actions) are maintained and controlled in accordance with ISO 9001 4.2.4 (see Section 2.5)

7.3.4 Design and development review	BP 08.04 Evaluate Incremental Work Products BP 08.07 Analyze Evaluation Results BP 11.10 Monitor Project Performance BP 11.11 Review and Analyze Project Performance BP 11.12 Take Corrective Action GP 2.11 Objectively Verify Work Products GP 2.15 Coordinate With Participants and Stakeholders

7.3.5 Design and Development Verification and 7.3.6 Design and Development Validation

Verification and validation are addressed in iCMM PA08 Evaluation and GP 2.11 Objectively Verify Work Products. Both are addressed in BP 08.04 for incremental work products; verification of end-products is addressed in BP 08.05 and validation of end-products is addressed in BP08.06. Records of results and corrective actions are covered in BP 08.07 and BP 11.12, respectively. ISO 9001 requires that records of the results of verification and validation and any necessary actions are maintained and controlled in accordance with ISO 4.2.4 (see Section 2.5). ISO 9001 requires completion of validation prior to delivery or implementation where practicable.

7.3.5 Design and development verification and 7.3.6 Design and Development Validation	BP 08.04 Evaluate Incremental Work Products BP 08.05 Verify end-Products BP 08.06 Validate end-products BP 08.07 Analyze Evaluation Results BP 11.12 Take Corrective Action GP 2.11 Objectively Verify Work Products

7.3.7 Control of Design and Development Changes

Design and development changes are addressed in the iCMM by PA 16 Configuration Management and by GP 2.9. BP 16.04 addresses identification, review, verification, validation and approval of changes. It also addresses evaluation of the effect of the changes on constituent parts and products already delivered, as well as maintaining records of reviews and actions. BP 02.08 and BP 11.11 also address review and analysis of changes. ISO 9001 requires that records of design and development

changes, reviews and necessary actions be maintained and controlled in accordance with ISO 4.2.4 (see Section 2.5). BP 16.05 addresses recording and reporting of changes.

7.3.7 Control of design and development changes	BP 02.08 Analyze and resolve requirement change requests BP 11.11 Review and Analyze Project Performance BP 16.04 Control Changes BP 16.05 Record and Report Configuration Status GP 2.9 Manage Work Products

7.4 Purchasing

The ISO 9001 section on Purchasing covers the purchasing process, purchasing information, and verification of the purchased product. The iCMM addresses these areas primarily in PA 05 Outsourcing and PA 12 Supplier Agreement Management, supported by GPs on responsibility, process, and planning.

7.4.1 Purchasing process

The purchasing process is addressed by iCMM PA 05 Outsourcing and PA 12 Supplier Agreement Management. BP 12.08 covers ensuring that products conform to requirements and BP 12.04 addresses controls applied to suppliers. ISO 9001 requires a level of control appropriate to the (criticality) of the product or component. Evaluation and selection of suppliers is covered in BP 05.02 and BP 05.04. Criteria for supplier selection is covered in BP 05.03 Criteria for selection, evaluation and re-evaluation should be addressed when implementing BP 05.03. BP 04.05 includes documentation of alternatives analysis (including alternative suppliers as referenced from BP05.04). ISO 9001 requires records of the results of evaluations and any necessary actions be maintained and controlled in accordance with ISO 4.2.4 (see Section 2.5)

7.4.1 Purchasing process	BP 04.05 Analyze Alternative Solutions BP 05.02 Identify Competent Suppliers BP 05.03 Prepare for the Solicitation or Tasking BP 05.04 Choose Supplier BP12.04 Monitor Supplier's Plans, Processes, Activities and Products BP 12.08 Determine Product or Service Acceptance

7.4.2 Purchasing Information

The iCMM covers purchasing information in PA 05 Outsourcing BP 05.03, including description and requirements on the product to be purchased as described in BP 05.03. ISO 9001 requires supplier personnel qualification and Quality Management System requirements, if appropriate, in purchasing information. GP 2.11 applied to PA 05 Outsourcing addresses ensuring the adequacy of requirements prior to communication to suppliers.

7.4.2 Purchasing information	BP 05.03 Prepare for the Solicitation or Tasking GP 2.11 Objectively Verify Work Products

7.4.3 Verification of purchased product

The establishment of inspection activities necessary to ensure purchased products meet specified requirements is addressed in the iCMM through application of GP 2.2 and GP 2.3 to PA 12 Supplier Agreement Management, particularly BP 12.08. The implementation of inspection activities necessary to ensure purchased products meet specified requirements is addressed in the iCMM BP 08.04, BP 08.05, BP 12.02 , BP 12.04 and BP 12.08. Verification arrangements are included in BP 05.03 and BP 08.01. ISO 9001 requires that the intended verification arrangements be stated in the purchasing information when verification is to be performed at the supplier's premises.

7.4.3 Verification of purchased product	BP 05.03 Prepare for Solicitation or Tasking BP 08.01 Develop Evaluation Strategy BP 08.04 Evaluate Incremental Work Products BP 08.05 Verify end-Products BP 12.02 Review and Monitor Agreement Performance BP 12.04 Monitor Supplier's Plans, Processes, Activities and Products BP 12.08 Determine Product or Service Acceptance GP 2.2 Document the Process GP 2.3 Plan the Process

7.5 Production and service provision

The ISO section on production and provision of service covers preparation and production of a product, and provision of a service, that meets the design and development output requirements, as well as preservation of the product. This area is covered by quite a number of iCMM practices as indicated below. PA 06 Design Implementation, PA 08 Evaluation, and PA 10 Operation and Support are key iCMM contributors.

7.5.1 Control of production and service provision

The iCMM addresses control of production and service provision in PA 06 Design Implementation; PA 09 Deployment, Transition, and Disposal; and PA 10 Operations and Support. GP 2.3 and GP 2.8 emphasize the control aspect. The availability of monitoring and measuring devices is addressed by BP 08.03. The availability and use of monitoring and measurement devices can also be addressed through the application of iCMM GP 2.4, applied to PA 06 Design Implementation. The availability of information that describes the characteristics of services is addressed by BP 06.03 and BP 09.02 . BP 03.08 and BP 17.04 can be applied to address availability of information that describes product characteristics (for use in production).

7.5.1 Control of production and service provision	BP 03.08 Establish and Maintain Design Description BP 06.01 Establish the Implementation Environment BP 06.03 Develop Documentation BP 08.03 Establish and Maintain the Evaluation Environment BP 08.04 Evaluate Incremental Work Products BP 08.05 Verify end-Products BP 08.06 Validate end-Products BP 09.01 Develop, Deploy, and Maintain a Strategy for Deployment, Transition and Disposal Activities BP 09.02 Prepare Facility and Infrastructure Environment BP 09.03 Oversee Configuration of Product or Service BP 09.05 Transition Product or Service BP 09.06 Deactivate and Dispose Replaced Product and/or Dispense with Service BP 10.01 Operate the System, Product or Service BP 10.02 Monitor and Evaluate Capacity, service, and performance BP 10.07 Provide Customer Support BP 17.04 Share Information GP 2.3 Plan the Process GP 2.4 Provide Adequate Resources GP 2.8 Consistently use and Manage the Process

The availability of work instructions is covered in iCMM by BP 06.01, BP 09.01 and BP 09.02. The use of suitable equipment is covered by BP 06.01 and BP 09.01. Implementation of monitoring and measurement occurs through iCMM BP 08.04, BP 08.05, and BP 08.06.

The considerable scope of the ISO 9001 sub-clause on the implementation of release, delivery and post delivery activities is addressed by the iCMM practices: BP 09.05, BP 09.03, BP 09.06, BP 10.01, BP 10.02 and BP 10.07.

7.5.2 Validation of processes for production and service provision

The iCMM addresses evaluation of processes in many places - most directly in BPs 10.05, 8.04, and 8.06. BPs 08.04 and 08.05 address the validation of incremental and end products respectively, including processes. BP 15.05 addresses detection of the need for corrective actions for processes and BP 10.05 addresses failure identification of services. Criteria for review and approval of processes is covered in BP 08.02. Approval of equipment is addressed in the iCMM through the application of GPs 2.3, 2.4, 2.15 and BP 11.07. These practices assure planning, coordination and commitment relating to adequate resources. BP 06.01 covers the use of specific methods and procedures for a production environment. Qualification of personnel is addressed in GP 2.6. ISO 9001 requires defined criteria for review and approval of processes, approval of equipment, use of specific methods and procedures, requirements for records, and revalidation. ISO 9001 also requires that organizations establish requirements for records relating to validation of processes in accordance with 4.2.4 (see Section 2.5).

7.5.2 Validation of processes for production and service provision	BP 06.01 Establish the Implementation Environment BP 08.02 Develop Evaluation Procedures BP 08.04 Evaluate Incremental Work Products BP 08.06 Validate End Products BP 10.05 Analyze Failures BP 11.07 Establish Commitment

	BP 15.05 Analyze Quality GP 2.3 Plan the Process GP 2.4 Provide Adequate Resources GP 2.15 Coordinate with Participants and Stakeholders

7.5.3 Identification and traceability

The iCMM addresses identification of products in BP 16.02. Product status with respect to requirements, traceability and unique identification are addressed in BP 16.05. All requirements (including those relating to monitoring and measuring) are identified in the application of iCMM BP 02.07. ISO 9001 requires organizations to control and record the unique identification of products where traceability is required.

7.5.3 Identification and traceability	BP 02.07 Record and Baseline Requirements BP 16.02 Identify and Baseline Configuration Items and Interim Work Products BP 16.05 Record and Report Configuration Status

7.5.4 Customer property

Most of the aspects of exercising care with customer property are addressed by the iCMM elements listed in the table below. Configuration Management assures identification and reporting for configuration items (BP 16.02) and BP 07.02 addresses incoming inspection (verification). Note that "supplier" can include customers. The condition/status of products, including reporting of such, is addressed by iCMM BP 16.05. ISO 9001 requires that records be maintained on customer property that is lost, damaged, or otherwise found to be unsuitable for use. BP 17.05 covers protection and safeguarding of information items. Customer property should be established as configuration items (to assure that all customer property is subject to Configuration Management) and protection and safeguarding of such.

7.5.4 Customer property	BP 07.02 Confirm Readiness of Product and Service Elements BP 16.02 Identify and Baseline Configuration Items and Interim Work Products BP 16.05 Record and Report Configuration Status BP 17.05 Protect Information

7.5.5 Preservation of product

The iCMM addresses the Preservation of product clause in PA09 Deployment. Requirements for handling and transportation are addressed in BP 02.02. BP 09.01 implicitly addresses preservation of product conformity through consideration of transition of responsibilities and identification of transition risks. ISO 9001 also requires preservation of product conformity in connection with packaging, storage and protection. BP 09.03 includes the use of checklists to assure that all product parts and documentation are transitioned to the customer. Actual transfer to the customer is covered in BP 09.05. The iCMM Information Management process area addresses the protection of documentation.

7.5.5 Preservation of product	BP 02.02 Identify Nonfunctional Requirements and Constraints BP 09.01 Develop, Deploy, and Maintain a Strategy for Deployment, Transition and Disposal activities. BP 09.03 Oversee Configuration of Product or Service BP 09.05 Transition Product or Service

7.6 Control of monitoring and measuring devices

Determination of monitoring and measuring to be undertaken is addressed by BP 18.01 and determination of the needed devices is included in iCMM BP 08.01 and BP 08.03. The establishment and execution of processes for monitoring and measurement are addressed by GP 2.2, GP 2.3 and GP 2.10 applied to PA 08 Evaluation and PA 18 Measurement. The ability of software to satisfy the intended application is addressed in BP 06.01, through the need to "…develop implementation environment software according to the project's software process". The application of GP 2.14 to BP 08.03, generally addresses corrective actions relating to calibration. Calibration frequency, calibration methods, records, identification of calibration status, safeguarding of calibration, protection during handling and storage, and the ability of software to satisfy the intended (measurement) application are addressed in the Additional Guidance Practices of the iCMM BP 08.04.

ISO 9001 address requires the use of calibration standards and traceability to them, assessment and recording of validity of previous measurements when calibration issues are discovered, and actions (GP 2.14) on equipment and products when equipment is found not to conform to requirements. ISO 9001 also requires records for the basis for calibration or verification (when no standards exist) and that records of results of calibration and verification be maintained and controlled in accordance with the ISO clause 4.2.4 (see Section 2.5).

7.6 Control of monitoring and measuring devices	BP 06.01 Establish the Implementation Environment BP 08.01 Develop Evaluation Strategy BP 08.03 Establish and Maintain Evaluation Environment BP 08.04 Evaluate Incremental Work Products BP 18.01 Establish Measures Based on Goals GP 2.2 Document the Process GP 2.3 Plan the Process GP 2.10 Objectively Assess Process Compliance GP 2.14 Take Corrective Action

8. Measurement, analysis and improvement

8.1 General

General (8.1) measurement, analysis and improvement requirements in ISO 9001 pertain to planning and implementing the monitoring, measurement, analysis and improvement processes needed to demonstrate conformity of product, conformity of the quality management system, and improvement of the quality management system. In the iCMM, PA 08 Evaluation includes analysis of evaluation results (BP 08.07), PA 15 Quality Assurance and Management includes monitoring (BP 15.02) and analysis (BP 15.05), and PA 18 Measurement and Analysis includes measurement (BP 18.01 and BP 18.02) and analysis (BP 18.04). Applying generic practices GP 2.3, GP 2.8 and GP 3.3 assures these processes are planned, implemented and improved.

8.1 General	BP 08.07 Analyze Evaluation Results BP 15.02 Monitor Process Compliance BP 15.05 Analyze Quality BP 18.01 Establish measures based on goals BP 18.02 Collect relevant measurement data BP 18.04 Analyze measurement data GP 2.3 Plan the Process GP 2.8 Consistently Use and Manage the Process GP 3.3 Improve Processes

8.2 Monitoring and Measurement

8.2.1 Customer Satisfaction

The ISO 9001 requirements regarding Customer satisfaction (8.2.1) are directly addressed in BP 01.06.

8.2.2 Internal Audit

Internal audit (8.2.2) is addressed by BP 15.02 and BP 15.03. The iCMM requires that these practices be performed "objectively", which is in accordance with ISO 9001 requirements for objectivity and impartiality. Applying GP 2.2 and GP 2.8 to PA 15 assures the establishment of a documented procedure for the internal audit process. This procedure should be maintained, by identifying it as a configuration item (BP 16.02). Planning these practices is required by GP 2.3, and for ISO 9001 considerations, the plan must define criteria, scope, frequency, and methods to be used; and must take into consideration the status and importance of processes and areas being audited, as well as the results of previous audits. Responsibilities are established using GP 2.5, when applied to PA 15 Quality Assurance and Management. Practices and products of PA 15 Quality Assurance and Management must themselves be objectively assessed and verified when GP 2.10 and GP 2.11 are applied to PA 15. GP 2.14 assures corrective action is taken to address problems identified, and for ISO 9001 certification, these actions must be taken "without undue delay" and must

include verification that actions were taken and reported. GP 2.13 assures that responsible management reviews internal audits. BP 15.01 requires that the system be maintained. BP 15.04 requires recording the results of quality assurance activities (including internal audits) and these must be maintained as records (see section 2.5).

8.2.1 Customer satisfaction	BP 01.06 Determine Customer Satisfaction
8.2.2 Internal Audit	BP 15.01 Establish a Quality Management System BP 15.02 Monitor Process Compliance BP 15.03 Monitor Product and Service Quality BP 15.04 Record and Report Results BP 16.02 Identify and Baseline Configuration Items and Interim Work Products GP 2.2 Document the Process GP 2.3 Plan the Process GP 2.5 Assign Responsibility GP 2.8 Consistently Use and Manage the Process GP 2.10 Objectively Assess Process Compliance GP 2.11 Objectively Verify Work Products GP 2.13 Review Performance with Higher-level Management GP 2.14 Take Corrective Action

8.2.3 Monitoring and Measurement of Processes and 8.2.4 Monitoring and Measurement of Product

Monitoring and measurement of processes (8.2.3) and product (8.2.4) are addressed as shown below. PA 18 Measurement and Analysis provides the required measurement practices, and PA 15 Quality Assurance and Management addresses monitoring process, monitoring product, and recording and reporting results. Note that evidence of product conformity is required and must be retained in records as described in section 2.5. PA 08 Evaluation includes verification of both incremental products and end-products, and PA 07 Integration practices BP 07.02 and BP 07.05 confirm product characteristics are acceptable during integration. The generic practices assure application to the organization's processes and products. BP 00.05 and BP 00.06 assure review of performance results, and may determine whether product release and service delivery shall proceed or not at a strategic level while BP 11.09 authorizes release and delivery at a project level based on BP 11.10, BP 11.11, and BP 11.12. The authorizing person must be included in the records indicating product release. (See also next section.)

8.2.3 Monitoring and measurement of processes	BP 00.05 Review performance BP 15.02 Monitor Process Compliance BP 15.04 Record and report results BP 15.06 Initiate quality improvement BP 18.01 Establish measures based on goals BP 18.02 Collect relevant measurement data BP 18.03 Store data and results BP 18.04 Analyze measurement data BP 18.05 Communicate results GP 2.10 Objectively Assess Process Compliance GP 2.12 Measure Performance GP 2.14 Take Corrective Action
8.2.4 Monitoring and measurement of product	BP 00.05 Review performance BP 00.06 Act on Results of Review BP 07.02 Confirm readiness of product and service elements BP 07.05 Confirm integrated product of service operation BP 08.04 Evaluate incremental work products BP 08.05 Verify end-Products BP 11.09 Direct the project BP 11.10 Monitor project performance BP 11.11 Review and Analyze Project Performance BP 11.12 Take corrective action BP 15.03 Monitor Product and Service Quality BP 15.04 Record and report results BP 18.01 Establish measures based on goals BP 18.02 Collect relevant measurement data BP 18.03 Store data and results BP 18.04 Analyze measurement data BP 18.05 Communicate results GP 2.11 Objectively Verify Work Products GP 2.12 Measure Performance GP 2.14 Take Corrective Action

8.3 Control of nonconforming product

ISO 9001 requirements here (8.3) are covered by the PA 08 Evaluation practices identified below. Project Management via BP 11.12 is required to take corrective action to act on problems related to nonconformity of the product, based on analysis performed in BP 08.07. Such action may preclude the original intended use or application of a nonconforming product. BP 10.06 pertains to actions regarding nonconforming products detected during operations. BP 16.04 Control Changes controls nonconforming products, preventing their unintended release, use or delivery. Two practices (BP 00.06 and BP 11.09) can authorize use, release or acceptance under concession by a relevant enterprise management or project authority. ISO 9001 requires a documented procedure and designated responsibilities and authorities for dealing with nonconforming product and this is addressed by applying GP 2.2, GP 2.8, and GP 2.5, and by identifying the procedure as a configuration item (BP 16.02). Note that records of nonconformities and actions taken must be retained in records as described in section 2.5.

8.3 Control of nonconforming product	BP 00.06 Act on Results of Review BP 08.02 Develop Evaluation Procedures BP 08.05 Verify end-Products BP 08.07 Analyze Evaluation Results BP 10.06. Take or initiate corrective action BP 11.09 Direct the project BP 11.12 Take Corrective Action BP 16.02 Identify and Baseline Configuration Items and Interim Work Products BP 16.04 Control Changes GP 2.2 Document the Process GP 2.5 Assign Responsibility. GP 2.8 Consistently Use and Manage the Process

8.4 Analysis of data

The ISO 9001 requirements pertaining to Analysis of data (8.4) are addressed by the practices indicated below. Information related to suppliers is provided via BP 12.02 which includes performing trend analysis and other measures of the results of reviews of supplier activities to detect and quantify issues in satisfying agreed requirements as early as possible.

8.4 Analysis of data	BP 01.06 Determine Customer Satisfaction BP 08.07 Analyze Evaluation Results BP 12.02 Review and Monitor Agreement Performance BP 15.05 Analyze Quality BP 18.02 Collect relevant measurement data BP 18.03 Store data and results BP 18.04 Analyze measurement data

8.5 Improvement

Continual improvement (8.5.1) requirements are captured most predominantly in iCMM practices of PA 21 Process Improvement, as identified below, and GP 3.3. BP 20.04 requires coordination and communication regarding policy and improvement activities; BP 08.07 and BP 15.05 include analysis of data used for improvement purposes; and BP 15.06 initiates quality improvement

8.5.1 Continual improvement	BP 08.07 Analyze Evaluation Results BP 15.05 Analyze Quality Data BP 15.06 Initiate Quality Improvement BP 20.04 Coordinate and Communicate Process Definition BP 21.02 Establish Process Improvement Program BP 21.04 Establish an Action Plan BP 21.05 Implement Improvements BP 21.07 Sustain and deploy Improvement Gains GP 3.3 Improve Processes

8.5.2 Corrective Action

Corrective action (8.5.2) in ISO 9001 requires taking actions to eliminate causes of nonconformance in order to prevent recurrence, as appropriate. Several iCMM practices support this requirement, or are sources of corrective action, as shown below. ISO 9001 further requires a documented procedure for corrective action, and this is accomplished in the iCMM by implementing GP 2.2 and GP 2.8 for the appropriate processes, and identifying the procedures as configuration items (BP 16.02). Note that records of the results of action taken must be retained in records as described in section 2.5.

8.5.2 Corrective action	BP 01.06 Determine Customer Satisfaction BP 08.07 Analyze Evaluation Results BP 10.05 Analyze failures BP 10.06 Take or initiate corrective action BP 10.07 Provide customer support BP 11.12 Take Corrective Action BP 15.05 Analyze Quality BP 15.06 Initiate Quality Improvement BP 15.07 Evaluate the Effect of Changes BP 16.02 Identify and Baseline Configuration Items and Interim Work Products BP 16.04 Control Changes GP 2.2 Document the Process GP 2.8 Consistently Use and Manage the Process GP 2.14 Take Corrective Actions

8.5.3 Preventive Action

Preventive action (8.5.3) in ISO 9001 requires determining action to eliminate the causes of potential nonconformities to prevent their occurrence. The Risk Management process area of the iCMM (PA 13) addresses many of these requirements by identifying and addressing potential nonconformities, as well as BP10.04 for performing preventive maintenance (to eliminate causes of potential problems and prevent their occurrence). The practices of PA 15 Quality Assurance and Management indicated below require causal analysis and the identification of preventive action. Performing BP 08.07 leads to recommending both corrective and preventive actions. ISO 9001 requires a documented procedure here, which is accomplished by applying GP 2.2 and GP 2.8 to the relevant processes, and identifying the procedures as configuration items via BP 16.02. Note that records of the results of action taken must be retained in records as described in section 2.5.

8.5.3 Preventive action	BP 08.07 Analyze Evaluation Results BP 10.04 Perform preventive maintenance BP 13.01 Develop Risk Management Approach BP 13.02 Identify Risks BP 13.03 Assess Risks BP 13.04 Develop Risk Mitigation Plans BP 13.05 Implement and Monitor Risk Mitigation Plans

	BP 15.05 Analyze Quality BP 15.06 Initiate Quality Improvement BP 15.07 Evaluate the Effect of Changes BP 16.02 Identify and Baseline Configuration Items and Interim Work Products GP 2.2 Document the Process GP 2.8 Consistently Use and Manage the Process

4. ISO 9001 Requirements that Support iCMM Practices

This section is organized by iCMM process area and provides selected summary information regarding how ISO 9001 requirements relate to iCMM practices. It intends to provide guidance to organizations that are already ISO 9001 certified by indicating how different parts of their quality manual might pertain to iCMM process areas and practices, and to point out where additional practices would need to be in place.

Rather than extracting and repeating each section of Table 2 for this description, the reader is asked to review the details in Table 2 and the iCMM document itself for further information.

PA 00 Integrated Enterprise Management

ISO 9001 requirements cover many parts of Integrated Enterprise Management, especially regarding establishing and communicating policy and objectives, and assuring management review, but several additional practices need to be in place in relation to the iCMM. For example, the organization would need to establish and maintain a strategic vision, strategic plans, and tactical plans to accomplish the strategy. Further, planned activities would need to address public responsibility and risks.

PA 01 Needs

Beyond ISO 9001 requirements, the Needs PA is very specific in assuring that customers and stakeholders are identified and that their needs, expectations and measures of effectiveness are elicited. The iCMM also emphasizes analysis of customer needs in the intended operational environment. ISO 9001 requirements pertaining to customer focus, customer communication, and customer satisfaction strongly support several iCMM practices, as indicated in Table 2.

PA 02 Requirements

Whereas ISO 9001 requires that an organization determine requirements related to the product, the iCMM Requirements PA is more specific in delineating the types of requirements that should be determined. For example, the iCMM expects the following to be identified: functional and performance requirements, nonfunctional requirements, constraints, key requirements, derived requirements, and interface requirements. PA 02 also addresses the need to maintain consistency and traceability among requirements and between requirements and plans, work products, and activities.

PA 03 Design

There is much more guidance regarding design activities in the iCMM than in ISO 9001 which focuses mostly on design inputs and outputs. Thus all practices of PA 03 Design (see Table 2) would need to be implemented.

PA 04 Alternatives Analysis

The only reference to alternatives analysis in ISO 9001 is in the context of evaluating and selecting suppliers. However, PA 04 provides guidance for structured analysis and decision-making and all the practices should be in place. These practices include establishing analysis strategy, selecting analysis methods, analyzing alternatives, selecting solutions, and communicating results.

PA 05 Outsourcing

The Purchasing requirements (7.4) in ISO 9001, along with Design and development output (7.3.3) align with most of the PA 05 Outsourcing practices of the iCMM, as indicated in Table 2.

PA 06 Design Implementation

ISO 9001 requirements for control of production and service provision align with PA 06 Design Implementation. Actual product formulation is not addressed in ISO 9001 however and would be expected to be implemented using PA 06 practices.

PA 07 Integration

PA 07 Integration practices pertaining to interface coordination and product assembly are not covered by ISO 9001 requirements. While ISO 9001 addresses overall planning of design and development, it does not specifically cover the integration sequence, as does the iCMM PA 07. Similarly, ISO clause 8.2.4 on monitoring and measurement of product addresses ongoing verification that products meet requirements (at appropriate stages), but does not address the separate action of confirming readiness for integration, e.g., with respect to the integration strategy schedule. The purpose of the iCMM practice on confirming integrated product or service operation is to check the basic functionality of an integrated product, to confirm that it is ready for evaluation prior to bringing the full resources of an evaluation to bear on the product (and risking the inefficiency of rescheduling should the product or service not be ready). While performance of ISO 9001 clause 8.2.4 might include such an activity, it does not necessarily do so. Because of these differences, the practices of the Integration process area should be implemented directly according to the iCMM.

PA 08 Evaluation

Many ISO 9001 requirements align with PA 08 Evaluation, as shown in Table 2, and meeting those ISO 9001 requirements should address iCMM PA 08 practice expectations.

PA 09 Deployment, Transition, and Disposal

The iCMM practice on demonstration of support capability is not addressed by ISO 9001, nor is the development, deployment and maintenance of a strategy for transition and disposal (although implementation of related activities is addressed). BP 09.02 on facility and infrastructure would be met by the indicated ISO 9001 clauses. For the other practices of PA 09, performance of the ISO 9001 clauses associated with PA 09 in Table 2 could meet the iCMM requirements, but would not necessarily be met due to their generality. For example, ISO 9001 requires controlled release and delivery, but the iCMM goes further in requiring transition to both the operation and the support requirements.

PA 10 Operation and Support

Although ISO 9001 calls for carrying out service provision under controlled conditions and cites several (a – f) such conditions, it is not all inclusive with respect to doing so in the intended environment and in the specified way, as is the case with the iCMM. ISO 9001 requires monitoring and measuring but does not say what is to be monitored and evaluated; whereas the iCMM specifically addresses capacity, service, and performance. ISO 9001 does not address the confirmation of availability of parts and personnel for sustainment during operation (service provision) as does the iCMM. The ISO clauses on preventive action, corrective action, control of nonconforming products, and customer communication cover the corresponding iCMM practices on performing preventive maintenance, failure analysis, initiation of corrective action and customer support.

PA 11 Project Management

The first two practices of PA 11 are adequately addressed by the ISO 9001 clauses indicated in Table 2. The practice on estimation of planning parameters is not covered and needs to be performed to meet iCMM requirements. The estimation of resources is covered in ISO 9001 but schedules are not. The establishment and maintenance of plans, as addressed in ISO 9001, is sufficient for the iCMM. While a number of activities related to establishment of commitment for plans and resources are addressed in the ISO 9001 clauses referenced in Table 2 for iCMM BP 11.07, the depth and breath of coverage is not sufficient; commitment should be should be obtained from affected groups and individuals as indicted in the iCMM. A similar situation exists for BP 11.09: plans, corrective actions, status should be communicated and coordination performed - in addition to the monitoring aspects of project direction. Organization to meet project objectives, not covered by ISO 9001, needs to be

performed. The iCMM practices on review/analysis of project performance and corrective action are adequately covered by the ISO 9001 clauses indicated in Table 2.

PA 12 Supplier Agreement Management

Four of the PA 12 practices, as indicated in Table 2, are not addressed by ISO 9001. The iCMM requires review and monitoring of supplier agreement performance at two levels – supplier plans/control systems and supplier activities/results (BPs 12.02 and 12.04). The corresponding ISO 9001 clauses indicated in Table 2 focus on review, verification and corrective action for products – addressing review of supplier plans and processes only indirectly. The iCMM practice on fostering a cooperative and collaborative environment is also only addressed indirectly. The iCMM practice on determination of product and service acceptance is sufficiently covered by the indicated ISO 9001 clauses; due to incomplete or indirect ISO 9001 coverage, all other PA 11 practices should be implemented via reference to the iCMM.

PA 13 Risk Management

ISO 9001 addresses risk management for technical (product nonconformity) risks at a high level in clause 8.5.3. Due to the increased detail in managing risk required by the iCMM and the need to address all risks, the risk management activities as indicated in PA 13 should be performed.

PA 14 Integrated Teaming

ISO 9001 addresses certain aspects of integrated teaming (e.g. assigning responsibilities and managing the interfaces and communication between groups), but does not address the key features of integrating the necessary disciplines and stakeholders, collaborative decision making and shared responsibilities. Team goals and issue resolution methods are not covered in ISO 9001. Because of these omissions, integrated teaming processes should be implemented via the PA 14 practices in order to meet iCMM requirements.

PA 15 Quality Assurance and Management

The ISO 9001 clauses in Table 2 corresponding to PA 15 practices meet the iCMM requirements for Quality Assurance and Management. Due to the more abstract language of ISO 9001, the iCMM practice descriptions and examples would be helpful in implementation of the ISO 9001 clauses.

PA 16 Configuration Management

A configuration management strategy should be established according to iCMM BP 16.01, as ISO 9001 does not fully address this area. Since the ISO 9001 coverage of the identification of configuration items is not explicit, the iCMM practice should be implemented. Given the application of configuration identification according to the

iCMM, the ISO 9001 references in Table 2 would suffice for establishing and maintaining a repository for work product baselines. Change control and recording/reporting of configuration status are adequately covered by the indicated ISO 9001 clauses. Configurations audits and inspections should be performed according to the iCMM practices as they are not explicitly addressed by ISO 9001.

PA 17 Information Management

To meet the iCMM requirements for an information management strategy, the strategy should address management of all information items that may be of value to an organization (i.e., in addition to a strategy for controlled items addressed by ISO 9001). An appropriate infrastructure for managing information needs to be established per the iCMM as this is not covered in ISO 9001. With the implementation of the above practices, the ISO clauses indicated in Table 2 would suffice for the iCMM practices on storage, protection and sharing. The establishment of standards for information should be implemented in accordance with the iCMM as it is not covered in ISO 9001.

PA 18 Measurement and Analysis

ISO 9001 requires measurable objectives, consistent with the quality policy. However, due to significant differences between ISO 9001 and the iCMM relating to measurement, either the iCMM should be used directly or the ISO 9001 clauses should be augmented to address the following differences. The iCMM goes beyond ISO 9001 in requiring the establishment of measurable objectives in that it requires the objectives to be based on issues and goals (whereas ISO 9001 does not require the objectives to be based on business goals). ISO 9001 addresses collection of measurement data and generation of results indicated by BP 18.02, but not the verification of measurement data. ISO 9001 requires the storing of measurement data and results (iCMM BP 1.03) in some cases (e.g., maintaining evidence of non conformity) but does not require retention of measurement results in general, as does the iCMM. The iCMM practice on analysis of measurement data is sufficiently covered by ISO 9001 as indicated in Table 2. ISO 9001 addresses communication of measurement results to the extent of maintaining records of nonconformity, but does not fully cover the iCMM requirements for communication of results to affected stakeholders.

PA 20 Process Definition

The ISO 9001 clauses in Table 2 relating to establishing standard processes fully address the requirements of the iCMM practice. The iCMM should be used directly to implement the other practices in PA 20 as ISO 9001 provides no coverage or insufficient coverage. The iCMM practices on tailoring guidelines and maintaining process assets are not addressed by ISO 9001. Although ISO 9001 addresses activities (8.5.1) that may be used for coordination and communication of process definition and improvement activities, it does not explicitly cover the iCMM practice.

PA 21 Process Improvement

ISO 9001 partially covers PA 21. It does not address the iCMM practices on process improvement goals and process appraisal. In establishing a process improvement program using the iCMM practice, an organization needs to plan the improvements based on goals and widespread participation; the corresponding ISO clause (Table 2) is not sufficient in this regard. ISO 9001 call for actions (8.5.1), but does not include analysis and planning as required by the iCMM practice. If an organization does the required planning and analysis, the indicated ISO clauses would meet the iCMM practice for implementing improvements. Performance of ISO 4.1 General Requirements clauses relating to criteria and methods, monitoring and measuring, and actions to achieve planned results would meet the requirements of the PA 21 practices on monitoring and confirming improvements. Sustainment and deployment of improvements should be performed according to the PA 21 practice as ISO 8.5.1 supports improvement sustainment and deployment, but does not provide the full coverage required by the PA 21 practice.

PA 22 Training

Training plans and training mechanisms should be established according to the practices of PA 22. Performance of clause ISO 6.2.2 would meet the requirements of the other practices of this process area.

PA23 Innovation

The practices of PA 23 should be performed according to the iCMM as ISO 9001 does not provide significant coverage in this area.

Generic Practices

In addition to the base practices discussed above, the iCMM provides a set of generic practices organized into 5 groups (capability levels). Each generic practice can be applied to each process area to improve the capability of the process area. These generic practices are listed in Table 3. ISO 9001 addresses some of these generic practices in a limited way. Examples are planning, resources, quality policy, review and verification. However, ISO 9001 does not indicate their specific application across all ISO 9001 clauses, as does the iCMM for each process area. Because of this difference, pursuit of iCMM capability levels beyond level 1 (base practices) should be done directly via the iCMM generic practices.

5. References and Further Information

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Mapping Table Supplement to the FAA-iCMM v2.0, October 2001.

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ISO 9000:2000(E), Quality management systems – Fundamentals and Vocabulary, International Organization for Standardization, Second edition, 2000-12-15.

ISO 9001:2000(E), Quality management systems – Requirements, International Organization for Standardization, Third edition, 2000-12-15.

ISO 9004:2000(E), Quality management systems – Guidelines for performance improvements, International Organization for Standardization, Second edition, 2000-12-15.

6. Acknowledgements

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Table 1: Mapping ISO 9001:2000 to FAA-iCMM v2.0	
ISO 9001:2000 Sub-clauses	**FAA-iCMM v2.0 Process Areas and Practices**
Section 4 – Quality management system	
4.1 General requirements	**PA 05 Outsourcing; PA 12 Supplier Agreement Management; PA 15 Quality Assurance and Management; PA 20 Process Definition; PA 21 Process Improvement**
4.1 General requirements	BP 05.01 Identify Needed Products or Services BP 12.04 Monitor Supplier's Plans, Processes, Activities and Products BP 15.01 Establish a Quality Management System BP 20.01 Establish Standard Processes BP 21.05 Implement Improvements BP 21.06 Confirm Improvements BP 21.08 Monitor Performance GP 2.4 Provide Adequate Resources GP 2.12 Measure Performance GP 2.13 Review Performance with Higher-level Management GP 2.14 Take Corrective Actions GP 3.1 Standardize the Process GP 3.3 Improve Processes
4.2 Documentation requirements	**PA 00 Integrated Enterprise Management; PA 08 Evaluation; PA 15 Quality Assurance and Management; PA 16 Configuration Management; PA 17 Information Management**
4.2.1 General	BP 00.01Establish and maintain strategic vision BP 15.01 Establish a Quality Management System BP 20.01 Establish Standard Processes GP 2.1 Establish Organizational Policy GP 2.2 Document the Process
4.2.2 Quality Manual	BP 15.01 Establish a Quality Management System BP 20.01 Establish Standard Processes BP 17.01 Establish Information Management Strategy GP 2.2 Document the Process GP 3.1 Standardize the Process
4.2.3 Control of Documents	BP 16.01 Establish a Configuration Management Strategy BP 16.02 Identify and Baseline Configuration Items and Interim Work Products BP 16.03 Establish and Maintain a Repository for Work Product Baselines BP 16.04 Control Changes BP 16.05 Record and Report Configuration Status BP 17.04 Share Information BP 17.05 Protect Information GP 2.2 Document the Process GP 2.8 Consistently Use and Manage the Process
4.2.4 Control of records	BP 08.07 Analyze Evaluation Results BP 15.04 Record and Report Results BP 16.02 Identify and Baseline Configuration Items and Interim

Table 1: Mapping ISO 9001:2000 to FAA-iCMM v2.0	
ISO 9001:2000 Sub-clauses	**FAA-iCMM v2.0 Process Areas and Practices**
	Work Products BP 16.03 Establish and Maintain a Repository for Work Product Baselines BP 16.04 Control Changes BP 17.01 Establish Information Management Strategy BP 17.03 Store Information BP 17.04 Share Information BP 17.05 Protect Information GP 2.2 Document the Process GP 2.8 Consistently Use and Manage the Process
Section 5 - Management responsibility	
5.1 Management commitment	**PA 00 Integrated Enterprise Management**
5.1 Management commitment	BP 00.01 Establish and maintain strategic vision. BP 00.02 Align to achieve the vision BP 00.03 Establish and maintain strategy BP 00.04 Develop and deploy action plans BP 00.05 Review performance BP 00.06 Act on results of review GP 2.1 Establish Organizational Policy GP 2.4 Provide Adequate Resources
5.2 Customer Focus	**PA 01 Needs; PA 02 Requirements**
5.2 Customer focus	BP 01.01 Identify Customers and Stakeholders BP 01.02 Elicit Needs BP 01.06 Determine Customer Satisfaction BP 02.07 Record and baseline requirements
5.3 Quality Policy	**PA 00 Integrated Enterprise Management**
5.3 Quality policy	BP 00.01 Establish and maintain strategic vision. BP 00.02 Align to achieve the vision BP 00.05 Review performance GP 2.1 Establish Organizational Policy
5.4 Planning (title only)	**PA 00 Integrated Enterprise Management; PA 01 Needs; PA 15 Quality Assurance and Management**
5.4.1 Quality objectives	BP 00.02 Align to achieve the vision BP 00.03 Establish and maintain strategy BP 00.04 Develop and deploy action plans BP 01.04 Establish and Maintain a Statement of Need BP 15.01 Establish a Quality Management System GP 2.3 Plan the Process
5.4.2 Quality management system planning	BP 15.01 Establish a Quality Management System GP 2.3 Plan the Process
5.5 Responsibility, authority, communication	**PA 00 Integrated Enterprise Management**
5.5.1 Responsibility and authority	GP 2.5 Assign Responsibility
5.5.2 Management representative	GP 2.5 Assign Responsibility

Table 1: Mapping ISO 9001:2000 to FAA-iCMM v2.0	
ISO 9001:2000 Sub-clauses	**FAA-iCMM v2.0 Process Areas and Practices**
5.5.3 Internal Communication	BP 00.02 Align to achieve the vision BP 00.03 Establish and maintain strategy BP 00.04 Develop and deploy action plans GP 2.15 Coordinate with Stakeholders
5.6 Management review	**PA 00 Integrated Enterprise Management; PA 11 Project Management**
5.6.1 General	BP 00.05 Review performance GP 2.13 Review Performance with Higher-level Management
5.6.2 Review input	BP 00.05 Review performance BP 11.11 Review and Analyze Project Performance GP 2.13 Review Performance with Higher-level Management
5.6.3 Review output	BP 00.05 Review performance BP 00.06 Act on Results of Review BP 11.11 Review and Analyze Project Performance BP 11.12 Take Corrective Action GP 2.13 Review Performance with Higher-level Management GP 2.14 Take Corrective Actions
Section 6 – Resource management	
6.1 Provision of Resources	**PA 00 Integrated Enterprise Management; PA 11 Project Management**
6.1 Provision of resources	BP 00.04 Develop and deploy action plans BP 11.07 Establish Commitment GP 2.4 Provide Adequate Resources (applied to PAs 00, 01, 08, 15, 20, and 21)
6.2 Human resources	**PA 00 Integrated Enterprise Management; PA 22 Training**
6.2.1 General	GP 2.6 Ensure Skill and Knowledge
6.2.2 Competence, awareness and training	BP 00.02 Align to achieve the vision. BP 22.01 Identify Training Needs BP 22.04 Train Individuals BP 22.05 Establish and Maintain Records BP 22.06 Assess Training Effectiveness BP 22.07 Establish Learning Environment GP 2.6 Ensure Skill and Knowledge
6.3 Infrastructure	**PA 08 Evaluation; PA 09 Deployment, Transition, and Disposal; PA 23 Innovation**
6.3 Infrastructure	BP 08.03 Establish and maintain evaluation environment BP 09.02 Prepare Facility and Infrastructure Environment BP 23.05 Manage Innovation GP 2.4 Provide Adequate Resources
6.4 Work environment	**PA 01 Needs; PA 05 Outsourcing; PA 06 Design Implementation; PA 08 Evaluation; PA 09 Deployment, Transition, and Disposal; PA 11 Project Management; PA 12 Supplier Agreement Management; PA 14 Integrated**

Table 1: Mapping ISO 9001:2000 to FAA-iCMM v2.0	
ISO 9001:2000 Sub-clauses	**FAA-iCMM v2.0 Process Areas and Practices**
	Teaming; PA 22 Training; PA 23 Innovation
6.4 Work environment	BP 01.03 Analyze Needs BP 05.05 Communicate with Suppliers BP 06.01 Establish the Implementation Environment BP 08.03 Establish and maintain evaluation environment BP 09.02 Prepare Facility and Infrastructure Environment BP 11.06 Establish and Maintain Plans BP 12.05 Foster Cooperative and Collaborative Environment. BP 14.03 Establish and Maintain a Collaborative Workplace BP 22.07 Establish Learning Environment BP 23.05 Manage Innovation GP 2.3 Plan the Process GP 2.4 Provide Adequate Resources
Section 7 - Product realization	
7.1 Planning of product realization	**PA 02 Requirements; PA 11 Project Management; PA 15 Quality Assurance and Management**
7.1 Planning of product realization	BP 02.07 Record and Baseline Requirements BP 11.01 Define Project Objectives, Scope, and Outputs BP 11.04 Estimate Project Resource Requirements BP 11.06 Establish and Maintain Plans BP 15.01 Establish a Quality Management System GP 2.2 Document the Process GP 2.3 Plan the Process GP 2.7 Establish Work Product Requirements GP 2.15 Coordinate with Participants and Stakeholders
7.2 Customer-related processes	**PA 00 Integrated Enterprise Management; PA 01 Needs; PA 02 Requirements; PA 08 Evaluation; PA 10 Operation and Support; PA 11 Project Management; PA 16 Configuration Management**
7.2.1 Determination of requirements related to the product	BP 01.02 Elicit Needs BP 01.03 Analyze Needs BP 02.01 Identify Functional and Performance Requirements BP 02.02 Identify Nonfunctional Requirements and Constraints BP 02.04 Derive Requirements BP 02.05 Identify External Interface Requirements GP 2.7 Establish Work Product Requirements
7.2.2 Review of requirements related to the product	BP 00.04 Develop and Deploy Action Plans BP 01.03 Analyze Needs BP 01.04 Establish and Maintain a Statement of Need BP 01.05 Communicate with Customers BP 02.06 Analyze Requirements BP 02.07 Record and Baseline Requirements BP 02.08 Analyze and Resolve Requirements Change Requests BP 08.04 Evaluate Incremental Work Products BP 11.01 Define Project Objectives, Scope, and Outputs BP 11.07 Establish Commitment BP 16.04 Control Changes

Table 1: Mapping ISO 9001:2000 to FAA-iCMM v2.0	
ISO 9001:2000 Sub-clauses	**FAA-iCMM v2.0 Process Areas and Practices**
	GP 2.11 Objectively Verify Work Products
7.2.3 Customer communication	BP 01.05 Communicate with Customers BP 01.06 Determine Customer Satisfaction BP 02.08 Analyze and Resolve Requirements Change Requests BP 10.07 Provide Customer Support GP 2.15 Coordinate with Stakeholders
7.3 Design and Development	**PA 02 Requirements; PA 03 Design; PA 05 Outsourcing; PA 06 Design Implementation; PA 07 Integration; PA 08 Evaluation; PA 11 Project Management; PA 14 Integrated Teaming; PA 16 Configuration Management**
7.3.1 Design and development planning	BP 07.01 Develop Integration strategy BP 08.01 Develop Evaluation Strategy BP 08.02 Develop Evaluation Procedures BP 11.01 Define Project Objectives, Scope, and Outputs BP 11.02 Define the Activities and Life Cycle Approach BP 11.06 Establish and Maintain Plans BP 11.07 Establish Commitment BP 14.02 Establish and Maintain Integrated teams BP 14.04 Establish Coordination and Communication Methods BP 14.06 Communicate Integrated Team Activity Results GP 2.3 Plan the Process GP 2.5 Assign Responsibility GP 2.15 Coordinate and Communicate with Stakeholders
7.3.2 Design and development inputs	BP 02.01 Identify Functional and Performance Requirements BP 02.02 Identify Nonfunctional Requirements and Constraints BP 02.04 Derive Requirements BP 02.06 Analyze Requirements BP 02.07 Record and Baseline Requirements BP 03.02 Develop Design Structure BP 08.01 Develop Evaluation Strategy BP 08.04 Evaluate Incremental Work Products
7.3.3 Design and development outputs	BP 03.06 Establish Component Specifications BP 03.08 Establish and Maintain Design Description BP 05.01 Identify Needed Products and Services BP 05.03 Prepare for Solicitation or Tasking BP 06.02 Formulate Product or Service Components BP 06.03 Develop Documentation BP 08.07 Analyze Evaluation Results BP 08.04 Evaluate Incremental Work Products BP 08.05 Verify end-Products BP 11.12 Take Corrective Action BP16.02 Identify and Baseline Configuration Items and Interim Work Products BP 16.04 Control Changes GP 2.9 Manage Work products GP 2.11 Objectively Verify Work Products GP 2.14 Take Corrective Action
7.3.4 Design and development review	BP 08.04 Evaluate Incremental Work Products

Table 1: Mapping ISO 9001:2000 to FAA-iCMM v2.0	
ISO 9001:2000 Sub-clauses	**FAA-iCMM v2.0 Process Areas and Practices**
	BP 08.07 Analyze Evaluation Results BP 11.10 Monitor Project Performance BP 11.11 Review and Analyze Project Performance BP 11.12 Take Corrective Action GP 2.11 Objectively Verify Work Products GP 2.15 Coordinate With Participants and Stakeholders
7.3.5 Design and development verification and 7.3.6 Design and Development Validation	BP 08.04 Evaluate Incremental Work Products BP 08.05 Verify end-Products BP 08.06 Validate end-products BP 08.07 Analyze Evaluation Results BP 11.12 Take Corrective Action GP 2.11 Objectively Verify Work Products
7.3.7 Control of design and development changes	BP 02.08 Analyze and resolve requirement change requests BP 11.11 Review and Analyze Project Performance BP 16.04 Control Changes BP 16.05 Record and Report Configuration Status GP 2.9 Manage Work Products
7.4 Purchasing	**PA 04 Alternatives Analysis; PA 05 Outsourcing; PA 08 Evaluation; PA 12 Supplier Agreement Management**
7.4.1 Purchasing process	BP 04.05 Analyze Alternative Solutions BP 05.02 Identify Competent Suppliers BP 05.03 Prepare for the Solicitation or Tasking BP 05.04 Choose Supplier BP12.04 Monitor Supplier's Plans, Processes, Activities and Products BP 12.08 Determine Product or Service Acceptance
7.4.2 Purchasing information	BP 05.03 Prepare for the Solicitation or Tasking GP 2.11 Objectively Verify Work Products
7.4.3 Verification of purchased product	BP 05.03 Prepare for Solicitation or Tasking BP 08.01 Develop Evaluation Strategy BP 08.04 Evaluate Incremental Work Products BP 08.05 Verify end-Products BP 12.02 Review and Monitor Agreement Performance BP 12.04 Monitor Supplier's Plans, Processes, Activities and Products BP 12.08 Determine Product or Service Acceptance GP 2.2 Document the Process GP 2.3 Plan the Process
7.5 Production and service provision	**PA 02 Requirements; PA 03 Design; PA 06 Design Implementation; PA 07 Integration; PA 08 Evaluation; PA 09 Deployment, Transition, and Disposal; PA 10 Operation and Support; PA 11 Project Management; PA 15 Quality Assurance and Management; PA 16 Configuration Management; PA 17 Information Management**
7.5.1 Control of production and service provision	BP 03.08 Establish and Maintain Design Description BP 06.01 Establish the Implementation Environment

Table 1: Mapping ISO 9001:2000 to FAA-iCMM v2.0	
ISO 9001:2000 Sub-clauses	**FAA-iCMM v2.0 Process Areas and Practices**
	BP 06.03 Develop Documentation BP 08.03 Establish and Maintain the Evaluation Environment BP 08.04 Evaluate Incremental Work Products BP 08.05 Verify end-Products BP 08.06 Validate end-Products BP 09.01 Develop, Deploy, and Maintain a Strategy for Deployment, Transition and Disposal Activities BP 09.02 Prepare Facility and Infrastructure Environment BP 09.03 Oversee Configuration of Product or Service BP 09.05 Transition Product or Service BP 09.06 Deactivate and Dispose Replaced Product and/or Dispense with Service BP 10.01 Operate the System, Product or Service BP 10.02 Monitor and Evaluate Capacity, service, and performance BP 10.07 Provide Customer Support BP 17.04 Share Information GP 2.3 Plan the Process GP 2.4 Provide Adequate Resources GP 2.8 Consistently use and Manage the Process
7.5.2 Validation of processes for production and service provision	BP 06.01 Establish the Implementation Environment BP 08.02 Develop Evaluation Procedures BP 08.04 Evaluate Incremental Work Products BP 08.06 Validate End Products BP 10.05 Analyze Failures BP 11.07 Establish Commitment BP 15.05 Analyze Quality GP 2.3 Plan the Process GP 2.4 Provide Adequate Resources GP 2.15 Coordinate with Participants and Stakeholders
7.5.3 Identification and traceability	BP 02.07 Record and Baseline Requirements BP 16.02 Identify and Baseline Configuration Items and Interim Work Products BP 16.05 Record and Report Configuration Status
7.5.4 Customer property	BP 07.02 Confirm Readiness of Product and Service Elements BP 16.02 Identify and Baseline Configuration Items and Interim Work Products BP 16.05 Record and Report Configuration Status BP 17.05 Protect Information
7.5.5 Preservation of product	BP 02.02 Identify Nonfunctional Requirements and Constraints BP 09.01 Develop, Deploy, and Maintain a Strategy for Deployment, Transition and Disposal activities. BP 09.03 Oversee Configuration of Product or Service BP 09.05 Transition Product or Service
7.6 Control of monitoring and measuring devices	**PA 06 Design Implementation; PA 08 Evaluation; PA 18 Measurement and Analysis**
7.6 Control of monitoring and measuring devices	BP 06.01 Establish the Implementation Environment BP 08.01 Develop Evaluation Strategy

Table 1: Mapping ISO 9001:2000 to FAA-iCMM v2.0	
ISO 9001:2000 Sub-clauses	**FAA-iCMM v2.0 Process Areas and Practices**
	BP 08.03 Establish and Maintain Evaluation Environment BP 08.04 Evaluate Incremental Work Products BP 18.01 Establish Measures Based on Goals GP 2.2 Document the Process GP 2.3 Plan the Process GP 2.10 Objectively Assess Process Compliance GP 2.14 Take Corrective Action
Section 8 - Measurement, analysis and improvement	
8.1 General	**PA 08 Evaluation; PA 15 Quality Assurance and Management; PA 18 Measurement and Analysis**
8.1 General	BP 08.07 Analyze Evaluation Results BP 15.02 Monitor Process Compliance BP 15.05 Analyze Quality BP 18.01 Establish measures based on goals BP 18.02 Collect relevant measurement data BP 18.04 Analyze measurement data GP 2.3 Plan the Process GP 2.8 Consistently Use and Manage the Process GP 3.3 Improve Processes
8.2 Monitoring and measurement	**PA 00 Integrated Enterprise Management; PA 01 Needs; PA 07 Integration; PA 08 Evaluation; PA 11 Project Management; PA 15 Quality Assurance and Management; PA 16 Configuration Management; PA 18 Measurement and Analysis**
8.2.1 Customer satisfaction	BP 01.06 Determine Customer Satisfaction
8.2.2 Internal Audit	BP 15.01 Establish a Quality Management System BP 15.02 Monitor Process Compliance BP 15.03 Monitor Product and Service Quality BP 15.04 Record and Report Results BP 16.02 Identify and Baseline Configuration Items and Interim Work Products GP 2.2 Document the Process GP 2.3 Plan the Process GP 2.8 Consistently Use and Manage the Process GP 2.10 Objectively Assess Process Compliance GP 2.11 Objectively Verify Work Products GP 2.13 Review Performance with Higher-level Management GP 2.14 Take Corrective Action
8.2.3 Monitoring and measurement of processes	BP 00.05 Review performance BP 15.02 Monitor Process Compliance BP 15.04 Record and report results BP 15.06 Initiate quality improvement BP 18.01 Establish measures based on goals BP 18.02 Collect relevant measurement data BP 18.03 Store data and results BP 18.04 Analyze measurement data BP 18.05 Communicate results

Table 1: Mapping ISO 9001:2000 to FAA-iCMM v2.0	
ISO 9001:2000 Sub-clauses	**FAA-iCMM v2.0 Process Areas and Practices**
	GP 2.10 Objectively Assess Process Compliance GP 2.12 Measure Performance GP 2.14 Take Corrective Action
8.2.4 Monitoring and measurement of product	BP 00.05 Review performance BP 00.06 Act on Results of Review BP 07.02 Confirm readiness of product and service elements BP 07.05 Confirm integrated product of service operation BP 08.04 Evaluate incremental work products BP 08.05 Verify end-Products BP 11.09 Direct the project BP 11.10 Monitor project performance BP 11.11 Review and Analyze Project Performance BP 11.12 Take corrective action BP 15.03 Monitor Product and Service Quality BP 15.04 Record and report results BP 18.01 Establish measures based on goals BP 18.02 Collect relevant measurement data BP 18.03 Store data and results BP 18.04 Analyze measurement data BP 18.05 Communicate results GP 2.11 Objectively Verify Work Products GP 2.12 Measure Performance GP 2.14 Take Corrective Action
8.3 Control of nonconforming product	**PA 00 Integrated Enterprise Management; PA 08 Evaluation; PA 10 Operation and Support; PA 11 Project Management; PA 16 Configuration Management**
8.3 Control of nonconforming product	BP 00.06 Act on Results of Review BP 08.02 Develop Evaluation Procedures BP 08.05 Verify end-Products BP 08.07 Analyze Evaluation Results BP 10.06. Take or initiate corrective action BP 11.09 Direct the project BP 11.12 Take Corrective Action BP 16.02 Identify and Baseline Configuration Items and Interim Work Products BP 16.04 Control Changes GP 2.2 Document the Process GP 2.5 Assign Responsibility GP 2.8 Consistently Use and Manage the Process
8.4 Analysis of data	**PA 01 Needs; PA 08 Evaluation; PA 12 Supplier Agreement Management; PA 15 Quality Assurance and Management; PA 18 Measurement and Analysis**
8.4 Analysis of data	BP 01.06 Determine Customer Satisfaction BP 08.07 Analyze Evaluation Results BP 12.02 Review and Monitor Agreement Performance BP 15.05 Analyze Quality BP 18.02 Collect relevant measurement data BP 18.03 Store data and results

Table 1: Mapping ISO 9001:2000 to FAA-iCMM v2.0	
ISO 9001:2000 Sub-clauses	**FAA-iCMM v2.0 Process Areas and Practices**
	BP 18.04 Analyze measurement data
8.5 Improvement	**PA 01 Needs; PA 08 Evaluation; PA 10 Operation and Support; PA 11 Project Management; PA 13 Risk Management; PA 15 Quality Assurance and Management; PA 16 Configuration Management; PA 20 Process Definition; PA 21 Process Improvement**
8.5.1 Continual improvement	BP 08.07 Analyze Evaluation Results BP 15.05 Analyze Quality Data BP 15.06 Initiate Quality Improvement BP 20.04 Coordinate and Communicate Process Definition BP 21.02 Establish Process Improvement Program BP 21.04 Establish an Action Plan BP 21.05 Implement Improvements BP 21.07 Sustain and deploy Improvement Gains GP 3.3 Improve Processes
8.5.2 Corrective action	BP 01.06 Determine Customer Satisfaction BP 08.07 Analyze Evaluation Results BP 10.05 Analyze failures BP 10.06 Take or initiate corrective action BP 10.07 Provide customer support BP 11.12 Take Corrective Action BP 15.05 Analyze Quality BP 15.06 Initiate Quality Improvement BP 15.07 Evaluate the Effect of Changes BP 16.02 Identify and Baseline Configuration Items and Interim Work Products BP 16.04 Control Changes GP 2.2 Document the Process GP 2.8 Consistently Use and Manage the Process GP 2.14 Take Corrective Actions
8.5.3 Preventive action	BP 08.07 Analyze Evaluation Results BP 10.04 Perform preventive maintenance BP 13.01 Develop Risk Management Approach BP 13.02 Identify Risks BP 13.03 Assess Risks BP 13.04 Develop Risk Mitigation Plans BP 13.05 Implement and Monitor Risk Mitigation Plans BP 15.05 Analyze Quality BP 15.06 Initiate Quality Improvement BP 15.07 Evaluate the Effect of Changes BP 16.02 Identify and Baseline Configuration Items and Interim Work Products GP 2.2 Document the Process GP 2.8 Consistently Use and Manage the Process

Table 2: Mapping FAA-iCMM v2.0 to ISO 9001:2000	
FAA-iCMM v2.0 Process Areas and practices	**ISO 9001:2000 Sub-clauses**
PA 00 Integrated Enterprise Management	**4.2 Documentation requirements** **5.1 Management commitment** **5.3 Quality policy** **5.4 Planning** **5.5 Responsibility, authority and communication** **5.6 Management review** **6.1 Provision of resources** **6.2 Human resources** **7.2 Customer-related processes** **8.2 Monitoring and measurement** **8.3 Control of nonconforming product**
Practices	
BP 00.01 Establish and maintain strategic vision	4.2.1 General 5.1 Management commitment 5.3 Quality policy
BP 00.02 Align to achieve the vision	5.1 Management commitment 5.3 Quality policy 5.4.1 Quality objectives 5.5.3 Internal communication 6.2.2 Competence, awareness, and training
BP 00.03. Establish and maintain strategy	5.1 Management commitment 5.4.1 Quality objectives 5.5.3 Internal communication
BP 00.04. Develop and deploy action plans	5.1 Management commitment 5.4.1 Quality objectives 5.5.3 Internal communication 6.1 Provision of resources 7.2.2 Review of requirements related to the product
BP 00.05. Review performance	5.1 Management commitment 5.3 Quality Policy 5.6.Management Review 5.6.1 General 5.6.2 Review Input 5.6.3 Review Output 8.2.3 Monitoring and measurement of processes 8.2.4 Monitoring and measurement of product
BP 00.06. Act on results of review	5.1 Management commitment 5.6.3 Review output 8.2.4 Monitoring and measurement of product 8.3 Control of nonconforming product
BP 00.07. Fulfill public responsibility	
PA 01 Needs	**5.2 Customer Focus** **5.4 Planning** **6.4 Work environment** **7.2 Customer-related processes** **8.2 Monitoring and measurement** **8.4 Analysis of data** **8.5 Improvement**

Table 2: Mapping FAA-iCMM v2.0 to ISO 9001:2000	
FAA-iCMM v2.0 Process Areas and practices	**ISO 9001:2000 Sub-clauses**
Practices	
BP 01.01 Identify Customers and Stakeholders	5.2 Customer Focus
BP 01.02 Elicit Needs	5.2 Customer Focus 7.2.1 Determination of requirements related to the product.
BP 01.03 Analyze Needs	6.4 Work environment 7.2.1 Determination of requirements related to the product. 7.2.2 Review of requirements related to the product
BP 01.04 Establish and Maintain a Statement of Need	5.4.1 Quality objectives 7.2.2 Review of requirements related to the product
BP 01.05 Communicate with Customers	7.2.2 Review of requirements related to the product 7.2.3 Customer Communication
BP 01.06 Determine Customer Satisfaction: Determine customer satisfaction with products and services.	5.2 Customer Focus 7.2.3 Customer Communication 8.2.1 Customer satisfaction 8.4 Analysis of data 8.5.2 Corrective action
PA 02 Requirements	**5.2 Customer Focus** **7.1 Planning of product realization** **7.2 Customer-related** **7.3 Design and development** **7.5 Production and service provision**
Practices	
BP 02.01 Identify Functional and Performance Requirements	7.2.1 Determination of requirements related to the product 7.3.2 Design and development inputs
BP 02.02 Identify Nonfunctional Requirements and Constraints	7.2.1 Identification of requirements related to the product 7.3.2 Design and/or development inputs 7.5.5 Preservation of product
BP 02.03 Identify key requirements	
BP 02.04 Derive requirements	7.2.1 Determination of requirements related to product 7.3.2 Design and development inputs
BP 02.05 Identify external interface requirements	7.2.1 Determination of requirements related to product
BP 02.06 Analyze requirements	7.2.2 Review of requirements related to the product 7.3.2 Design and development inputs
BP 02.07 Record and baseline requirements	5.2 Customer focus 7.1 Planning of product realization 7.2.2 Review of requirements related to the product 7.3.2 Design and development inputs 7.5.3 Identification and traceability
BP 02.08 Analyze and resolve requirements change requests	7.2.2 Review of product requirements 7.2.3 Customer communication 7.3.7 Control of design and development changes
BP 02.09 Maintain consistency and traceability	
PA 03 Design	**7.3 Design and development** **7.5 Production and service provision**
Practices	
BP 03.01 Identify and Prioritize Design Issues	
BP 03.02 Develop Design Structure	7.3.2 Design and development inputs
BP 03.03 Develop Interface Specifications	

Table 2: Mapping FAA-iCMM v2.0 to ISO 9001:2000	
FAA-iCMM v2.0 Process Areas and practices	**ISO 9001:2000 Sub-clauses**
BP 03.04 Allocate Requirements	
BP 03.05 Define Interactions among Design Elements	
BP 03.06 Establish Component Specifications	7.3.3 Design and development outputs
BP 03.07 Establish and Use a Strategy for Non-developmental Items	
BP 03.08 Establish and Maintain Design Description	7.3.3 Design and development outputs 7.5.1 Control of production and service provision
PA 04 Alternatives Analysis	**7.4 Purchasing**
Practices	
BP 04.01 Establish Analysis Strategy	
BP 04.02 Define the Problem	
BP 04.03 Select Analysis Method	
BP 04.04 Identify Alternative Solutions	
BP 04.05 Analyze Alternative Solutions	7.4.1 Purchasing process
BP 04.06 Select Solution	
BP 04.07 Communicate Analysis Results	
PA 05 Outsourcing	**4.1 General requirements** **6.4 Work environment** **7.3 Design and development** **7.4 Purchasing**
Practices	
BP 05.01 Identify Needed Products or Services	4.1 General requirements 7.3.3 Design and development outputs
BP 05.02 Identify Competent Suppliers	7.4.1 Purchasing process
BP 05.03 Prepare for the Solicitation or Tasking	7.3.3 Design and development outputs 7.4.2 Purchasing information 7.4.1 Purchasing process 7.4.3 Verification of purchased product
BP 05.04 Choose Supplier	7.4.1 Purchasing process
BP 05.05 Communicate with Suppliers	6.4 Work environment
PA 06 Design Implementation	**6.4 Work environment** **7.3 Design and development** **7.5 Production and service provision** **7.6 Control of monitoring and measuring devices**
Practices	
BP 06.01 Establish the Implementation Environment	6.4 Work environment 7.5.1 Control of production and service provision 7.5.2 Validation of processes for production and service provision 7.6 Control of monitoring and measuring devices
BP 06.02 Formulate product or service components	7.3.3 Design and development outputs
BP 06.03 Develop Documentation	7.3.3 Design and development outputs 7.5.1 Control of production and service provision
PA 07 Integration	**7.3 Design and development** **7.5 Production and service provision** **8.2 Monitoring and measurement**
Practices	
BP 07.01 Develop Integration Strategy.	7.3.1 Design and development planning

Table 2: Mapping FAA-iCMM v2.0 to ISO 9001:2000	
FAA-iCMM v2.0 Process Areas and practices	**ISO 9001:2000 Sub-clauses**
BP 07.02 Confirm Readiness of Product and Service Elements.	7.5.4 Customer property 8.2.4 Monitoring and measurement of product
BP 07.03 Review and Coordinate Interface Definitions.	
BP 07.04 Assemble Product and Service Elements.	
BP 07.05 Confirm Integrated Product or Service Operation	8.2.4 Monitoring and measurement of product
PA 08 Evaluation	**4.2 Documentation requirements** **6.3 Infrastructure** **6.4 Work environment** **7.2 Customer-related processes** **7.3 Design and development** **7.4 Purchasing** **7.5 Production and service provision** **7.6 Control of monitoring and measuring devices** **8.1 General** **8.2 Monitoring and measurement** **8.3 Control of nonconforming product** **8.5 Improvement**
Practices	
BP 08.01 Develop Evaluation Strategy.	7.3.1 Design and development planning 7.3.2 Design and development inputs 7.4.3 Verification of purchased product 7.6 Control of monitoring and measuring devices
BP 08.02 Develop Evaluation Procedures	7.3.1 Design and development planning 7.5.2 Validation of processes for production and service provision 8.3 Control of nonconforming product
BP 08.03 Establish and Maintain Evaluation Environment	6.3 Infrastructure 6.4 Work Environment 7.5.1 Control of production and service provision 7.6 Control of monitoring and measuring devices
BP 08.04 Evaluate incremental work products	7.2.2 Review of requirements related to the product 7.3.2 Design and development inputs 7.3.3 Design and development outputs 7.3.4 Design and development review 7.3.5 Design and development verification 7.3.6 Design and Development Validation 7.4.3 Verification of purchased product 7.5.1 Control of production and service provision 7.5.2 Validation of processes for production and service provision 7.6 Control of monitoring and measuring devices 8.2.4 Monitoring and measurement of product
BP 08.05 Verify end-Products	7.3.3 Design and development outputs 7.3.5 Design and development verification 7.4.3 Verification of purchased product 7.5.1 Control of production and service provision 8.2.4 Monitoring and measurement of product 8.3 Control of nonconforming product
BP 08.06 Validate end-products	7.3.6 Design and development validation 7.5.1 Control of production and service provision

Table 2: Mapping FAA-iCMM v2.0 to ISO 9001:2000	
FAA-iCMM v2.0 Process Areas and practices	**ISO 9001:2000 Sub-clauses**
	7.5.2 Validation of processes for production and service provision
BP 08.07 Analyze Evaluation Results	4.2.4 Control of records 7.3.3 Design and development outputs 7.3.4 Design and development review 7.3.5 Design and development verification 8.1 General 8.3 Control of nonconforming product 8.4 Analysis of data 8.5.1 Continual improvement 8.5.2 Corrective action 8.5.3 Preventive action
PA 09 Deployment, Transition and Disposal	**6.3 Infrastructure** **6.4 Work environment** **7.5 Production and service provision**
Practices	
BP 09.01 Develop, Deploy, and Maintain a Strategy for Deployment, Transition and Disposal Activities	7.5.1 Control of production and service provision 7.5.5 Preservation of product
BP 09.02 Prepare Facility and Infrastructure Environment	6.3 Infrastructure 6.4 Work Environment 7.5.1 Control of production and service provision
BP 09.03 Oversee Configuration of Product or Service	7.5.1 Control of production and service provision 7.5.5 Preservation of product
BP 09.04 Demonstrate Support Capability	
BP 09.05 Transition Product or Service	7.5.1 Control of production and service provision 7.5.5 Preservation of product
BP 09.06 Deactivate and Dispose Replaced Product and/or Dispense with Service	7.5.1 Control of production and service provision
PA 10 Operation and Support	**7.2 Customer-related processes** **7.5 Production and service provision** **8.3 Control of nonconforming product** **8.4 Analysis of data** **8.5 Improvement**
Practices	
BP 10.01. Operate the system, product or service	7.5.1 Control of production and service provision
BP 10.02. Monitor and evaluate capacity, service, and performance	7.5.1 Control of production and services provision
BP 10.03. Confirm availability of parts and personnel	
BP 10.04. Perform preventive maintenance	8.5.3 Preventive action
BP 10.05. Analyze failures	7.5.2 Validation of processes for production and service provision 8.5.2 Corrective action
BP 10.06. Take or initiate corrective action	8.3 Control of nonconforming product 8.5.2 Corrective Action
BP 10.07. Provide customer support	7.2.3 Customer communication 7.5.1Control of production and service provision 8.5.2 Corrective action

Table 2: Mapping FAA-iCMM v2.0 to ISO 9001:2000	
FAA-iCMM v2.0 Process Areas and practices	**ISO 9001:2000 Sub-clauses**
PA 11 Project Management	**5.6 Management review** **6.1 Provision of resources** **6.4 Work environment** **7.1 Planning of product realization** **7.2 Customer-related processes** **7.3 Design and development** **7.5 Production and service provision** **8.2 Monitoring and measurement** **8.3 Control of nonconforming product** **8.5 Improvement**
Practices	
BP 11.01 Define Project Objectives, Scope, and Outputs	7.1 Planning of product realization 7.2.2 Review of requirements related to the product 7.3.1 Design and development planning
BP 11.02 Define the Activities and Life Cycle Approach	7.3.1 Design and development planning
BP 11.03 Estimate Planning Parameters	
BP 11.04 Estimate Project Resource Requirements	7.1 Planning of product realization
BP 11.05 Establish Schedules	
BP 11.06 Establish and Maintain Plans	6.4 Work environment 7.1 Planning of product realization 7.3.1 Design and development planning
BP 11.07 Establish Commitment	6.1 Provision of resources 7.2.2 Review of requirements related to the product 7.3.1 Design and development planning 7.5.2 Validation of processes for production and service provision
BP 11.08 Organize to meet Project Objectives	
BP 11.09 Direct the Project	8.2.4 Monitoring and measurement of product 8.3 Control of nonconforming product
BP 11.10 Monitor Project Performance	7.3.4 Design and development review 8.2.4 Monitoring and measurement of product
BP 11.11 Review and Analyze Project Performance	5.6.2 Review Input 5.6.3 Review output 7.3.4 Design and development review 7.3.7 Control of design and development changes 8.2.4 Monitoring and measurement of product
BP 11.12 Take Corrective Action	5.6.3 Review output 7.3.3 Design and development outputs 7.3.4 Design and development review 7.3.5 Design and development verification 8.2.4 Monitoring and measurement of product 8.3 Control of nonconforming product 8.5.2 Corrective action
PA 12 Supplier Agreement Management	**4.1 General requirements** **6.4 Work environment** **7.1 Planning of product realization** **7.4 Purchasing** **8.3 Control of nonconforming product** **8.4 Analysis of data**
Practices	

Table 2: Mapping FAA-iCMM v2.0 to ISO 9001:2000	
FAA-iCMM v2.0 Process Areas and practices	**ISO 9001:2000 Sub-clauses**
BP 12.01 Use Planning documents:	
BP 12.02 Review and Monitor Agreement Performance	7.4.3 Verification of purchased product 8.4 Analysis of data
BP 12.03 Maintain Supplier Agreement Integrity	
BP 12.04 Monitor Supplier's Plans, Processes, Activities and Products	4.1 General requirements 7.4.3 Verification of purchased product 7.4.1 Purchasing process
BP 12.05 Foster Cooperative and Collaborative Environment.	6.4 Work environment
BP 12.06 Analyze and Direct Agreement Activities	
BP 12.07 Administer Supplier Agreement	
BP 12.08 Determine Product or Service Acceptance	7.1 Planning of product realization 7.4.3 Verification of purchased product
PA 13 Risk Management	**8.5 Improvement**
Practices	
BP 13.01 Develop Risk Management Approach	8.5.3 Preventive action
BP 13.02 Identify Risks	8.5.3 Preventive action
BP 13.03 Assess Risks	8.5.3 Preventive action
BP 13.04 Develop Risk Mitigation Plans	8.5.3 Preventive action
BP 13.05 Implement and Monitor Risk Mitigation Plans	8.5.3 Preventive action
PA 14 Integrated Teaming	**6.4 Work environment** **7.3 Design and development**
Practices	
BP 14.01 Develop and Communicate Team Goals	
BP 14.02 Establish and Maintain Integrated Teams	7.3.1 Design and development planning
BP 14.03 Establish and Maintain a Collaborative Workplace	6.4 Work environment
BP 14.04 Establish Coordination and Communication Methods	7.3.1 Design and development planning (interfaces and communication between groups)
BP 14.05 Establish Resolution Methods	
BP 14.06 Communicate Integrated Team Activity Results	7.3.1 Design and development planning
PA 15 Quality Assurance & Management	**4.1 General requirements** **4.2 Documentation requirements** **5.4 Planning** **7.1 Planning of product realization** **7.5 Production and service provision** **8.1 General** **8.2 Monitoring and measurement** **8.4 Analysis of data** **8.5 Improvement**
Practices	
BP 15.01 Establish a Quality Management System	4.1 General requirements 4.2.1 General 4.2.2 Quality manual 5.4.1 Quality objectives

Table 2: Mapping FAA-iCMM v2.0 to ISO 9001:2000	
FAA-iCMM v2.0 Process Areas and practices	**ISO 9001:2000 Sub-clauses**
	5.4.2 Quality management system planning 7.1 Planning of product realization 8.2.2 Internal Audit
BP 15.02 Monitor Process Compliance	8.1 General 8.2.2 Internal audit 8.2.3 Monitoring and measurement of processes
BP 15.03 Monitor Product and Service Quality	8.2.2 Internal audit 8.2.4 Monitoring and measurement of product
BP 15.04 Record and Report Results	4.2.4 Control of records 8.2.2 Internal Audit 8.2.3 Monitoring and measurement of processes 8.2.4 Monitoring and measurement of product
BP 15.05 Analyze Quality	7.5.2 Validation of processes for production and service provision 8.1 General 8.4 Analysis of data 8.5.1 Continual improvement 8.5.2 Corrective action 8.5.3 Preventive action
BP 15.06 Initiate Quality Improvement	8.2.3 Monitoring and measurement of processes 8.5.2 Corrective action 8.5.3 Preventive action 8.5.1 Continual improvement
BP 15.07 Evaluate the Effect of Changes	8.5.2 Corrective action 8.5.3 Preventive action
PA 16 Configuration Management	**4.2 Documentation requirements** **7.2 Customer-related processes** **7.3 Design and development** **7.5 Production and service provision** **8.2 Monitoring and measurement** **8.3 Control of nonconforming product** **8.5 Improvement**
Practices	
BP 16.01 Establish a Configuration Management Strategy	4.2.3 Control of Documents
BP 16.02 Identify and Baseline Configuration Items and Interim Work Products	4.2.3 Control of Documents 4.2.4 Control of records 7.3.3 Design and development outputs 7.5.3 Identification and traceability 7.5.4 Customer property 8.2.2 Internal audit. 8.3 Control of nonconforming product 8.5.2 Corrective action 8.5.3 Preventive action
BP 16.03 Establish and Maintain a Repository for Work Product Baselines	4.2.3 Control of Documents 4.2.4 Control of records
BP 16.04 Control Changes	4.2.3 Control of Documents 4.2.4 Control of records 7.2.2 Review of requirements related to the product 7.3.3 Design and development outputs 7.3.7 Control of design and development changes

Table 2: Mapping FAA-iCMM v2.0 to ISO 9001:2000	
FAA-iCMM v2.0 Process Areas and practices	**ISO 9001:2000 Sub-clauses**
	8.3 Control of nonconforming product 8.5.2 Corrective action
BP 16.05 Record and Report Configuration Status	4.2.3 Control of Documents 7.3.7 Control of design and development changes 7.5.3 Identification and traceability 7.5.4 Customer property
BP 16.06 Conduct Configuration Audits and Inspections	
PA 17 Information Management	**4.2 Documentation requirements** **7.5 Production and service provision**
Practices	
BP 17.01 Establish Information Management Strategy	4.2.2 Quality Manual 4.2.4 Control of records
BP 17.02 Establish Information Management Capability	
BP 17.03 Store Information	4.2.4 Control of records
BP 17.04 Share Information	4.2.3 Control of documents 4.2.4 Control of records 7.5.1 Control of production and service provision
BP 17.05 Protect Information	4.2.3 Control of documents 4.2.4 Control of records 7.5.4 Customer property
BP 17.06 Establish Information Standards	
PA 18 Measurement and Analysis	**7.6 Control of monitoring and measuring devices** **8.1 General** **8.2 Monitoring and measurement** **8.4 Analysis of data**
Practices	
BP 18.01 Establish measures based on goals	7.6 Control of monitoring and measurement devices 8.1 General 8.2.3 Monitoring and measurement of processes 8.2.4 Monitoring and measurement of product
BP 18.02 Collect relevant measurement data	8.1 General 8.2.3 Monitoring and measurement of processes 8.2.4 Monitoring and measurement of product 8.4 Analysis of data
BP 18.03 Store data and results	8.2.3 Monitoring and measurement of processes 8.2.4 Monitoring and measurement of product 8.4 Analysis of data
BP 18.04 Analyze measurement data	8.1 General 8.2.3 Monitoring and measurement of processes 8.2.4 Monitoring and measurement of product 8.4 Analysis of data
BP18.05 Communicate results	8.2.3 Monitoring and measurement of processes 8.2.4 Monitoring and measurement of product
PA 20 Process Definition	**4.1 General requirements** **4.2 Documentation requirements** **8.5 Improvement**
Practices	
BP 20.01 Establish Standard Processes	4.1 General requirements 4.2.1 General

Table 2: Mapping FAA-iCMM v2.0 to ISO 9001:2000	
FAA-iCMM v2.0 Process Areas and practices	**ISO 9001:2000 Sub-clauses**
	4.2.2 Quality manual
BP 20.02 Develop Tailoring Guidelines	
BP 20.03 Maintain Process Assets	
BP 20.04 Coordinate and Communicate Process Definition	8.5.1 Continual Improvement
PA 21 Process Improvement	**4.1 General requirements** **8.5 Improvement**
Practices	
BP 21.01 Identify Process Improvement Goals	
BP 21.02 Establish Process Improvement Program	8.5.1 Continual improvement
BP 21.03 Appraise process	
BP 21.04 Establish an Action Plan	8.5.1 Continual improvement
BP 21.05 Implement Improvements	4.1 General requirements 8.5.1 Continual improvement
BP 21.06 Confirm Improvements	4.1 General requirements
BP 21.07 Sustain and deploy Improvement Gains	8.5.1 Continual improvement
BP 21.08 Monitor Performance	4.1 General requirements
PA 22 Training	**6.2 Human Resources** **6.4 Work Environment**
Practices	
BP 22.01 Identify Training Needs	6.2.2 Competence, awareness and training
BP 22.02 Establish Training Plan	
BP 22.03 Establish Training Mechanism	
BP 22.04 Train Individuals	6.2.2 Competence, awareness and training
BP 22.05 Establish and Maintain Records	6.2.2 Competence, awareness and training
BP 22.06 Assess Training Effectiveness	6.2.2 Competence, awareness and training
BP 22.07 Establish Learning Environment	6.2.2 Competence, awareness and training 6.4 Work environment
PA 23 Innovation	**6.3 Infrastructure** **6.4 Work Environment**
Practices	
BP 23.01 Maintain New Technology Awareness	
BP 23.02 Select New Technologies	
BP 23.03 Prepare for Infusion	
BP 23.04 Infuse New Technologies	
BP 23.05 Manage Innovation	6.3 Infrastructure 6.4 Work Environment

Table 3: FAA-iCMM v2.0 Generic Practices	
	GP Title and Statement
Capability Level 1	**1.1 Identify Work Scope** Identify the scope of the work to be performed and work products or services to be produced and communicate this information to those performing the work
	1.2 Perform the Process Perform a process that implements the base practices of the process area to provide work products and /or services to a customer.
Capability Level 2	**2.1 Establish Organizational Policy** Establish and maintain an organizational policy for performing the process.
	2.2 Document the Process Document the process for performing the practices of the process area.
	2.3 Plan the Process Establish and maintain a plan to accomplish the objectives of the process.
	2.4 Provide Adequate Resources Provide resources that are adequate for performing the process as planned.
	2.5 Assign Responsibility Establish responsibility, authority, and commitment for performing the process.
	2.6 Ensure Skill and Knowledge Ensure that the people performing the process have the needed skill and knowledge.
	2.7 Establish Work Product Requirements Establish and maintain requirements on work products and services that result from the process.
	2.8 Consistently Use and Manage the Process Consistently use the documented plans, standards, processes, or procedures in implementing and managing (planning and tracking) the process.
	2.9 Manage Work Products Place identified work products of the process under appropriate levels of configuration management.
	2.10 Objectively Assess Process Compliance Objectively assess adherence of the performed process to the documented process.
	2.11 Objectively Verify Work Products Objectively verify adherence of work products and services to established requirements.
	2.12 Measure Process Performance Measure performance against the plan.
	2.13 Review Performance with Higher-level Management Review the activities, status, and results of the process with higher-level management.
	2.14 Take Corrective Action Take corrective actions to address problems.
	2.15 Coordinate With Participants and Stakeholders Coordinate and communicate among those performing the process and with appropriate stakeholders.
Capability Level 3	**3.1 Standardize the Process** Establish and maintain a set of standard processes for the organization, including tailoring guidelines.
	3.2 Establish and Use a Defined Process Establish and use a defined process, designed to meet specific business objectives, that is tailored from the organization's set of standard processes.
	3.3 Improve Processes Collect and use work products, measures, measurement results, and improvement information to improve the standard and defined processes.
Capability Level 4	**4.1 Stabilize Process Performance** Select measures key to meeting business objectives and bring processes relevant to those measures under statistical process control.
Capability Level 5	**5.1 Pursue Process Optimization** Pursue improvement to the performance of statistically managed processes based on business objectives, innovation, and removal of common problems.